

THE IRON AGE

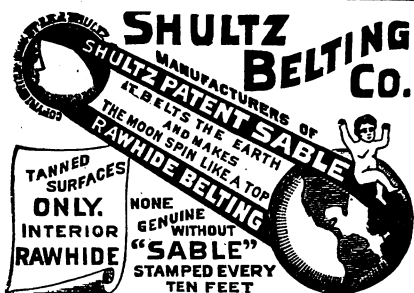
A Review of the Hardware, Iron and Metal Trades.

Published every Thursday Morning by David Williams, Nos. 96, 98, 100 & 102 Reade St., New York.

Vol. LII: No. 18. New York, Thursday, November 2, 1893.

\$4.50 a Year, including Postage.
Single Copies, Ten Cents.

Reading Matter Contents.....page 828
Classified List of Advertisers.... " 117
Alphabetical Index to Advertisers " 121
Advertising and Subscription Rates " 835



Send for circular "I" to
SHULTZ BELTING CO.,
ST. LOUIS, MO.
NEW YORK, N. Y., 225 Pearl St., A. B. Laurence, Mgr.
BOSTON, MASS., 184 Summer St., G. J. Kelley, Mgr.
PHILADELPHIA, PA., 129 N. 5d St., J. Garnett, Mgr.

TUDOR IRON WORKS
ST. LOUIS
Manufacturers of
**MINING RAILS, SPIKES,
TRACK FASTENINGS.**

Every Hardware and Mill Supply Dealer
Should Sell Bristol's Patent
**STEEL BELT
LACING.**
Send for show
card, circular
and free samples
THE BRISTOLS' MFG. CO., Waterbury, Conn.
New York Office, 121 Liberty St.

BRAIDED CORD.
Send for Samples.
Sash Cord, Bell Cord,
Clothes Lines, Masons' Lines;
SAMSON CORDAGE WORKS, Boston, Mass.

TURNBUCKLES.
BRANCH OFFICE: Cleveland
136 Liberty St., City Forge and Iron Co.,
NEW YORK. CLEVELAND, O.

Send for Catalogue and Trade Discounts.
**"COPPERIZED C. R. SWEDOH
STEEL OILERS"**
TRADE MARKS REGD.
ALL SIZES & STYLES
BURNISHED FINISH
CHEAP & ELEGANT
SCALE 1-12 SIZE
No. 10, 14, 18, 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 40, 42, 44, 46, 48, 50, 52, 54, 56, 58, 60, 62, 64, 66, 68, 70, 72, 74, 76, 78, 80, 82, 84, 86, 88, 90, 92, 94, 96, 98, 100.
LARGE STOCK, BEST OF GOODS & FACILITIES
THE WILMOT & HOBBS MFG. CO
HOT & COLD ROLLING MILLS AND FACTORIES
BRIDGEPORT, CONN., U. S. A.
STORE, 20 MURRAY ST., NEW YORK.
Dealers will find it to their advantage to place
a large stock order early, as they will be ex-
ecuted in the order in which they are received.
This is the best selling line of Oilers ever pro-
duced.

AS A DEALER FOR
"NITRO CLUB"
PAPER SHOT SHELLS.
10, 12 AND 16 GAUGE.

The "Nitro Club" Shell is designed to meet the demand for
a moderate priced shell adapted to Nitro Powders.

NOT SOLD AT RETAIL BY THE MANUFACTURERS,

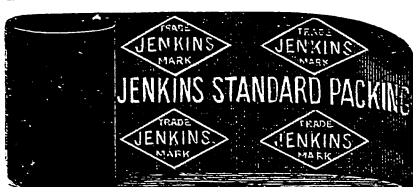
The Union Metallic Cartridge Co.,
BRIDGEPORT, CONN.

RANDOLPH & CLOWES,

WATERBURY, - CONN.
Western Depot, 71 West Washington St., Chicago, Ill.

Branch Offices: 104 John St., New York.
423 Chestnut St., Philadelphia, Pa.
21 Milk St., Boston, Mass.
Room 208 Neave Building, Cincinnati, O.

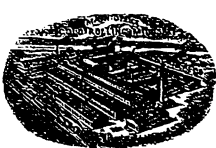
SEAMLESS DRAWN BRASS AND COPPER TUBING.
Hot and Cold Rolled Sheet Copper and Brass of all kinds.



JENKINS' STANDARD PACKING
For Steam or Joint Packing has no superior. It
is manufactured in all thicknesses. It is not
loaded to increase weight. Does not ROT or
BURN OUT. Every sheet is stamped with Trade
Mark, like cut.

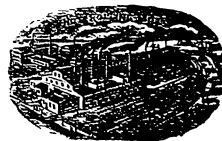
JENKINS BROS.,
New York, Philadelphia, Boston and Chicago.

THE WILMOT & HOBBS MFG. COMPANY,



MAIN OFFICE, MILLS AND FACTORIES AT
BRIDGEPORT, CONN.
STORE, 20 MURRAY ST., NEW YORK.
(CONNECTED BY TELEPHONE.)

BESSEMER, OPEN HEARTH,
And the Celebrated and Unequaled



Annual Capacity 15,000 Tons
Cold Rolled Steel.

"SWEDOH"
(REGISTERED TRADE-MARK.)

Annual Capacity 30,000 Tons
Hot Rolled Steel.

HOT AND COLD ROLLED STEEL.

Used for all Pressed, Stamped and Drawn Work. Easily Brass, Copper, Bronze or Nickel Plated, Tinned
or Japanned. Furnished with plain Blue, Pickled, Annealed or Bright Surface, and with Round
Edges or Sheared to Exact width, Coiled or Cut to Lengths, and in any Degree of Stiffness or
Ductility required. SEND FOR NEW STEEL DEPARTMENT PAMPHLET. For samples of the difficult
stamped and drawn work which can be made from "Swedoh" Steel, call at any Hardware
Store and ask to be shown our "Anti-Rust Copperized C. R. SWEDOH Steel OILERS."

Rainey Connellsville Coke.
Furnace and Foundry

The only Coke you can buy and know you are getting the best that can be manufactured. All our works in
the heart of the Region, within four miles of Connellsville, Pa.

CAPACITY, 3,000 TONS DAILY.

W. J. RAINEY, MAIN OFFICE: **CLEVELAND, OHIO.**
Mercantile Bank Building.

THE
ANSONIA BRASS
AND **COPPER CO.**

MANUFACTURERS OF
BRASS AND COPPER

Seamless Tubes, Sheets, Rods and Wire.

Ingot Copper.

SOLE MANUFACTURERS

Tobin Bronze

(TRADE-MARK.)

Condenser Plates, Pump Linings, Wire, Round,
Square and Hexagon Bars, for Pump
Piston Rods and Bolt Forgings.

19 & 21 Cliff Street, - - New York.

THE
New Haven Copper Co.,

SOLE MAKERS OF

POLISHED COPPER

Under Patent of T. James, Sept. 12, 1876.

ALSO MANUFACTURERS AND

DEALERS IN

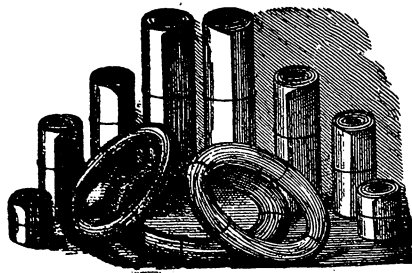
BRAZIERS' & SHEATHING COPPER,

Kettles, Bottoms, Bolts, Circles, &c.,

ALSO MANUFACTURERS OF

Cast Steel Augers and Bits of Superior Quality.

294 Pearl St., NEW YORK.



Waterbury Brass Co.

Established 1845.

Sheet, Roll and Platers' Brass,

German Silver, Copper, Brass and Ger-
man Silver Wire, Brass and
Copper Tubing,

**COPPER RIVETS AND BURS,
PERCUSSION CAPS,
TAPE MEASURES,
METALLIC EYELETS,**

Brass Kettles, Brass Tags, Powder Flasks,
Shot Pouches, &c.,

AND SMALL BRASS WARES OF EVERY DESCRIPTION.
HICK'S PRIMERS. BERDAN PRIMERS.

*Cartridge Metal in Sheets or
Shells a Specialty.*

Sole Agents for the CAPEWELL MFG. CO.'S
Line of Sporting Goods.

DEPOTS:

296 Broadway, New York. 125 Eddy St., Provi-
dence, R. I.

MILLS AT WATERBURY, CONN.

**The Metal Worker's Handy-Book
OF RECEIPTS AND PROCESSES,**

BEING A COLLECTION OF CHEMICAL FORMULAS AND PRACTICAL
MANIPULATIONS FOR THE WORKING OF ALL
THE METALS AND ALLOYS, INCLUDING THE DECO-
RATION AND BEAUTIFYING OF ARTICLES
MANUFACTURED THEREFROM, AS WELL
AS THEIR PRESERVATION.

Edited from Various Sources by

WILLIAM T. BRANNT.

500 Pages, Cloth, \$2.50.

Sent, post-paid, on receipt of price, by
DAVID WILLIAMS, Publisher and Bookseller
96-102 Reade St., New York.

**THE CELEBRATED ACID RESISTING DEOXIDIZED BRONZE
IN INGOTS OR CASTINGS, AND**

DEOXIDIZED BABBITT METALS.

BEST IN THE WORLD.

Large Castings a Specialty.

Bridgeport Deoxidized Bronze and Metal Co.,
BRIDGEPORT, CONN.

MATTHIESSEN & HEGELER ZINC CO.,

LA SALLE, ILLINOIS,

SMELTERS OF SPELTER.

AND MANUFACTURERS OF

SHEET ZINC AND SULPHURIC ACID.

Special Sizes of Zinc cut to order. Rolled Battery Plates.

Selected Plates for Etchers' and Lithographers' use.

Selected Sheets for Paper and Card Makers' use.

Stove and Washboard Blanks.

ZINCS FOR LECLANCHE BATTERY.

BRASS GOODS MFG. CO.,

Mfrs. of Stamped Brass, Silver and Nickeled Goods, Brass Labels for Cans and Rubber Moulds,

BRONZE DOOR KNOBS

Bronze and Plated Roses, Combined Rose and Escutcheon Plates, Socket Shells, &c., Patent Mirror Pin
Cushion Business Cards, Mucilage Brushes. Novelties of new design made to order.

SALESROOM: 88 Chambers St., New York. FACTORY: 86-92 Third St., So. Brooklyn.

HENDRICKS BROTHERS,

Proprietors of the

Belleville Copper Rolling Mills,

Manufacturers of

Braziers', Bolt and Sheathing

COPPER.

COPPER WIRE AND RIVETS.

Importers and Dealers in

Ingot Copper, Block Tin, Spelter, Lead, Antimony, etc.
49 CLIFF ST., NEW YORK.

THE PLUME & ATWOOD MFG. CO.

MANUFACTURERS OF

Sheet and Roll Brass

—AND—

WIRE,

GERMAN SILVER AND GILDING METAL,
COPPER RIVETS AND BURS, COP-
PER ELECTRICAL WIRE,

Pins, Brass Butt Hinges, Jack Chain,
Kerosene Burners, Lamp
Trimmings, &c.

18 MURRAY ST., NEW YORK.

71 PEARL ST., BOSTON.

90 MARKET ST., CHICAGO.

ROLLING MILL, FACTORIES:
THOMASTON, CONN. | WATERBURY, CONN.

SCOVILL MFG. COMPANY,

Manufacturers of

BRASS

Sheet, Wire, Tubes.

**BUTT HINGES,
BUTTONS,**

**LAMP GOODS,
NOVELTIES.**

PURE ALUMINUM

INGOT and SHEETS.

FACTORIES, WATERBURY, CONN.

DEPOTS:

423 Broome Street, New York.
210 Lake Street, Chicago.
29 High Street, Boston.

JOHN DAVOL & SONS,

AGENTS FOR

Brooklyn Brass & Copper Co.,

DEALERS IN

INGOT COPPER, SPELTER, LEAD, TIN,
ANTIMONY, SOLDER & OLD METALS,

100 John Street, - New York.

WILLIAM S. FEARING.

100 Chambers St., NEW YORK,

SELLS TO THE TRADE

*Sheet Brass, Fancy Sheet Brass,
German Silver, Copper, Brass
and German Silver Wire,*

*Brazed and Seamless Brass and
Copper Tubes, Brass and Cop-
per Rods, Brass Ferrules,*

Pure Copper Wire,

*Sheet and Ingot Copper, Spelter,
Tin, Antimony, Lead, &c.*

Rough Casting of Aluminum.

Aluminum Bronze, German Silver Bronze and all
kinds of Metals. Manufacturers of Chandeliers, Metal
Picture Frames, Ink Stands, Figures, Statues, etc.
Stair Carpet Holders a Specialty.

St. Louis Bronze & Aluminum Works,

3741-3743 North Broadway,

ST. LOUIS, MO.

BRASS CASTINGS.

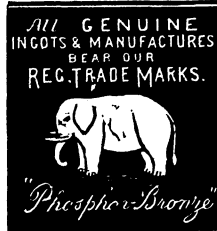
We have now completed one of the best
equipped foundries in the country for making
fine bronze and brass castings, and solicit orders
for same from special patterns.

KEYSTONE LOCK WORKS,

E. T. FRAM, - - Lancaster, Pa.

Published by DAVID WILLIAMS, 96-102 Reade Street,
New York. Printed by THE WILLIAMS PRINTING
CO., General Book, Commercial and Newspaper
Printers and Binders, Nos. 96-102 Reade St.
New York.

**ELEPHANT
TRADE-MARK.**



PHOSPHOR-BRONZE
INGOTS, CASTINGS, WIRE, SHEET & C.
THE PHOSPHOR BRONZE SMELTING CO. LIMITED
512 ARCH ST. PHILADELPHIA PA. U.S.A.
ORIGINAL MANUFACTURERS OF PHOSPHOR-BRONZE IN THE UNITED STATES AND SOLE MAKERS OF "ELEPHANT BRAND" PHOSPHOR-BRONZE.

**PHOSPHOR
BRONZE.**

Parsons' Manganese Bronze and White Brass.

MADE IN THE UNITED STATES EXCLUSIVELY BY

**THE WILLIAM CRAMP & SONS SHIP and ENGINE BUILDING CO.,
PHILADELPHIA, PA.**

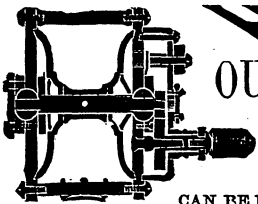
MANGANESE BRONZE PROPELLERS

— ARE USED BY THE —

Cunard, Pacific Mail, Hamburg American, White Star, International, Morgan, Canadian Pacific, North German Lloyds and many other Steam Ship Companies, and principal Naval Powers.

Parsons' White Brass; the Most Approved Anti-Friction Metal.

G. DOUGLAS PETRIE, Agent, - Nos. 39 & 41 Cortlandt Street, New York.



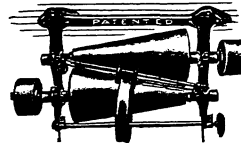
HENDRYX
EVERY REEL WARRANTED.
OUTING says of Hendryx patented Adjustable Globe Bearing Aluminum Reels, "perfectly constructed and beautifully finished in every part, these Reels work as truly as watches." Actual weights, Single Action, 2½ ounces; Multiplying, 4½ ounces; Quadruple, 4½ ounces.

THE ANDREW B. HENDRYX CO., NEW HAVEN, CONN., U. S. A.
CAN BE PURCHASED FROM ANY FIRST-CLASS DEALERS IN FISHING TACKLE.

**BRASS, BRONZE,
COMPOSITION and F.L. GAYLORD CO. Send
ALUMINUM ANSONIA, for
CASTINGS, Heavy and Light. CONN. Prices.**

**GENUINE
PHOSPHOR TIN,**
MANUFACTURED BY THE
**CROSBY STEAM GAGE
AND VALVE CO.**
Boston, Mass., U. S. A.
Branches: NEW YORK, CHICAGO AND LONDON.

EVANS FRICTION CONES.



For regulating the speed of machines automatically or by hand. Thousands of sets in operation driving all kinds of machinery which require from 1 to 50 H.-P. Address
Evans Friction Cone Co.,
85 Water Street,
Boston, Mass.

**THE CRESCENT TRY IT!
AND YOU WILL USE NO OTHER**
**THE CRESCENT BRAND
PHOSPHOR
TIN.**
THE HIGHEST AND
RICHEST GRADE MADE.
MANUFACTURED ONLY BY
THE CRESCENT PHOSPHORIZED METAL CO
OFFICE AND WORKS
2107 2109 and 2111 INDIANA AV. PHILADELPHIA, PA.

CROWN SMELTING COMPANY,
Chester, Pa.
Bronze, Brass and Composition Castings.
Inventors and Sole Manufacturers of
"Crown Bronze" Bearing Metal and "Crown ROLLING MILL Babbitt Metal."
Manufacturers of **PHOSPHOR-BRONZE TO PENNSYLVANIA RAILROAD.**
Specifications in Ingot metal or castings.

The W.W. & R. M. KEYS CO.,

Bronze,
Composition
and
Brass
Castings
of all kinds,
also
Babbitt
Metals.

BRIDGEPORT, CONN.

PHOSPHOR-TIN
BY USING MY PHOSPHOR TIN-MANUFACTURERS CAN MAKE ANY DESIRED GRADE PHOSPHOR BRONZE THEMSELVES. BY THE SIMPLE PROCESS OF MELTING, MUCH CHEAPER THAN THEY ARE NOW TO BE HAD IN THE MARKET. NEW OR OLD COPPER CAN BE USED. FOR CIRCULARS AND PRICES ADDRESS **HALK & NAUMANN**, NEW-YORK. SOLE AGENTS FOR THE U.S. AND CANADA, 3 PEARL

BEST, FOX & CO.,
25th Street and A. V. Ry. - **PITTSBURG, PA.**
SOLE MANUFACTURERS OF
CLIMAX BRONZE
FOR ALL PURPOSES.
CASTINGS from 1 oz. to 12,000 lbs.

The American Metal Co.
(LIMITED),
Levin Building, 80 Wall St., New York.
P. O. BOX 957.
COPPER, COPPER ORES AND MATTES.
TIN, LEAD, SPELTER, ANTIMONY, NICKEL,
ALUMINUM, BULLION, IRON.
Advances made on Consignments.
AGENTS FOR
Henry R. Merton & Co., - London.
Metallgesellschaft, Frankfurt-on-Main.
Williams, Foster & Co., Ltd., Swansea.

WASHBURN & MOEN MANUFACTURING CO.,

WORKS IN WORCESTER, MASS., and WAUKEGAN, ILL.

MAKERS OF IRON, STEEL AND COPPER

EVERY VARIETY OF **W I R E** FOR ALL PURPOSES.

FINE OIL TEMPERED SPRINGS A SPECIALTY.

SPIRALFURNITURE,
BED AND
SPECIAL
SPRINGS.**FLAT**CLOCK
and
WATCH
SPRINGS.

EXPORT ORDERS PROMPTLY FILLED.

Warehouses: 16 Cliff and 241 Pearl Sts., New York; 107 & 109 Lake St., Chicago; 8 & 10 Pine St., San Francisco.

**BARBED WIRE,
PLAIN WIRE
AND WIRE NAILS.**

Quick Shipment. Write for Prices.

Indiana Wire Fence Co.,

Crawfordsville, Ind.

AMERICAN SPIRAL SPRING CO.

MANUFACTURERS OF

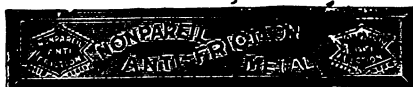
ALL KINDS OF SPIRAL SPRINGS.

OFFICE AND WORKS:

Shingiss and Bluff Streets, - PITTSBURGH, PA.
TELEPHONE 705.**WM. MCFARLAND,
IRON FOUNDER,
TRENTON, - - N. J.
Chilled Cast Wire DIES**

A SPECIALTY.

Any Size or Style Made at Short Notice.



Guaranteed.

Best Anti-Friction Metal for all machinery bearings. For high speed and heavy crushing weight it has no equal. Introduced in this country since 1891 and has displaced all Anti-Friction metals it has come in contact with.

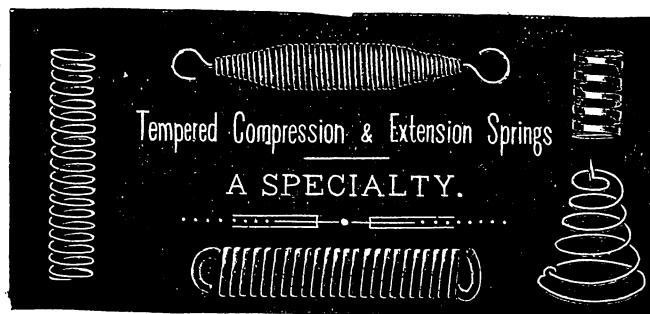
THEODORE HERTZ & SON, SOLE MFRS.

Manufacturers Babbitt Metals, Solder, Lead Seals, Electrotypes and Stereotype Metal.
30th St. & Park Ave., St. Louis, Mo.**MILLER & VAN WINKLE,**

MANUFACTURERS OF

STEEL WIRE AND STEEL SPRINGS.

TEMPERED STEEL WIRE.



MACHINERY SPRINGS.

Tempered Compression & Extension Springs
A SPECIALTY.OFFICE AND WORKS: }
18 to 24 Bridge Street, } BROOKLYN, N. Y.VOLUTE,
WIRE
and
FLAT STEEL**SPRINGS**Agricultural Implements, Machinery and various other purposes.
Write for prices to
SABIN MACHINE CO.,
MANUFACTURERS.
MONTPELIER, VT.



117th to 118th Street and Harlem River.

General Offices, Foot 118th Street, New York.



Makers of Iron, Bessemer, Siemens-Martin and Crucible Cast Steel Wire of all kinds, annealed, soft and hard drawn; Coppered Spring Wire for Furniture Springs, &c., Coppered Soft Wires, Baling Wires, Suspension Bridge and Rope Wires of all kinds, &c.

STEEL MUSIC WIRES and MUSIC SPRING WIRES,

UNRIVALED FOR PIANOFORTE STRINGS.

FOR THE HIGHEST CLASS OF SPRINGS.

Specialty of finest Cast Steel Wires, round, flat, square and any other shape, tempered and also in the soft state, guaranteed to harden and temper. Solid Rib and Paragon Umbrella Wires. Crinoline, Corset, Shade Roller, Lock, Hat, Brush, Saw.

Band Saw, Clock Spring, Clock Bell, Clock Verge and Watch Spring, Rule and Tape Line and Eyeglass Wires, &c.

Plane, Needle, Fish Hook, Drill and Hair Spring Wires. Special Cast Steel Wires of any kind made for special purposes. Also Covered Wires—Braided and Cloth and Paper Covered—for crinoline, corset and other purposes. Cold Rolled and Slit soft and Tempered Steel Strips of all kinds and for all purposes.

Special Wires and Springs of Every Description.

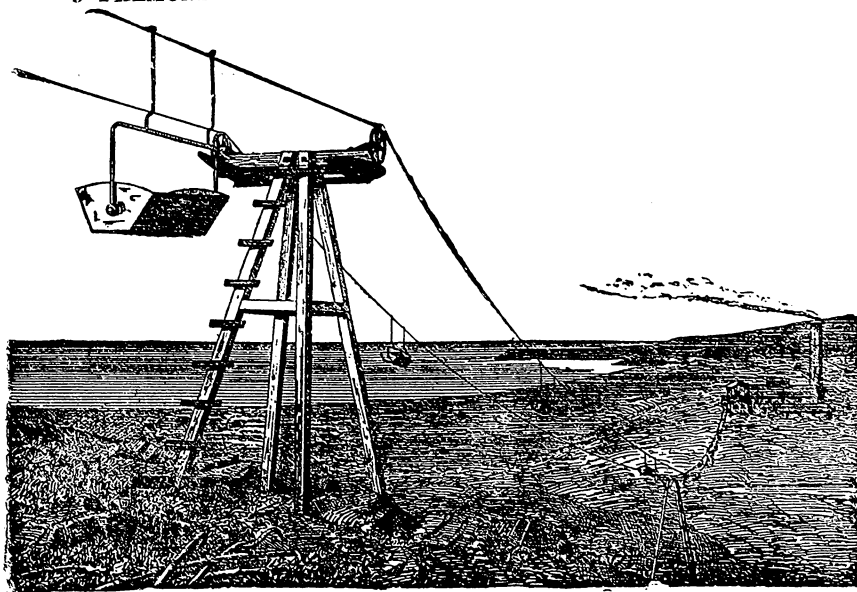
CORRESPONDENCE SOLICITED.

SAMPLES FURNISHED ON APPLICATION.

CALIFORNIA WIRE WORKS,

9 FREMONT STREET.

SAN FRANCISCO, CAL.



MANUFACTURERS OF

WIRE ROPE FOR CABLE RAILWAYS AND MINING PURPOSES.

HALLIDIE'S PATENT WIRE ROPEWAY,

Simplest and most economical means of transportation.

Send for Illustrated Catalogue.

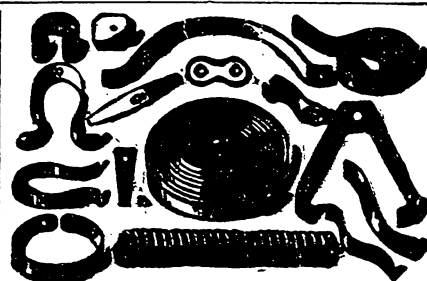
THE CELEBRATED

"SILVER FINISH"

GALVANIZED POULTRY NETTINGS.

FOR SALE BY THE HARDWARE TRADE.

GET THE BEST.



DUNBAR BROS.,

Manufacturers of

Clock Springs and Small Springs

of every description, from best Cast Steel,

BRISTOL, CONN.

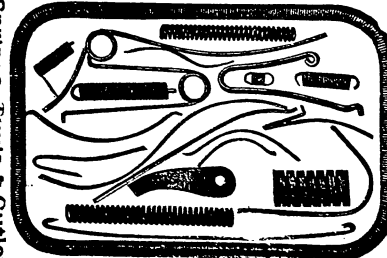
FRED NOURSE CO.,



STEEL WIRE AND STEEL SPRINGS,

315, 317 and 319 East 22d St., New York.

TUCK M'F'G CO., Brockton Mass



Springs, Tools & Cutlery

Send for Catalogue.

Tempered Springs of all kinds.

**Always
Ask
For**



Unequaled for Strength
and Durability.

Made Only by

Broderick & Bascom Rope Co.,
St. Louis, Mo.

**HOWSON
AND
HOWSON**

Counsellors at Law
Solicitors of Patents

PHILADELPHIA
Forrest Building, 119 S. 4th St.
NEW YORK
Potter Building, 38 Park Row.
WASHINGTON
Atlantic Building, 928 F St.

PATENTS

U. S. and Foreign Secured.
Trade Marks and Copy Rights. Twenty
Years' Experience. Send model or sketch
and brief description of your invention for
Free report as to patentability. Expert
searches and opinions as to Scope, Valid-
ity and Infringement. Patent Causes
Prosecuted and Defended. Practice in
U. S. Supreme, Circuit and Circuit Ap-
peals Courts, and U. S. Patent Office.

Send for "Plain Words about Patents." Free.
PATENT PRACTICE EXCLUSIVELY.
References Furnished on Application.
M. B. STOCKING, Attorney at Law,
611 F ST., N. W., WASHINGTON, D. C.

PATENTS.

H. W. T. JENNER, Patent Attorney and Me-
chanical Expert. 519 Seventh St., Washington,
D.C. Charges moderate. Write for terms.
Established 1883.

SPRINGS—RIVETS.

Specialties in

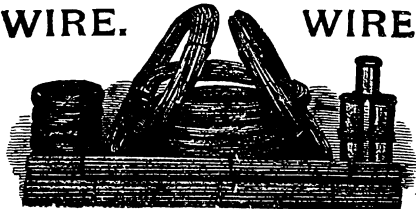
SHEET METAL WORK,
CLOCK and INDICATOR POINTERS,
CLARK & COWLES, Plainville, Ct.

GEO. W. PRENTISS & CO.

HOLYOKE, MASS.,

—MANUFACTURERS OF—

WIRE. WIRE



Bright, Coppered, Annealed and Tin Plated.
Finished to order, round, square, oval or flat.
TINNED WIRE OF ALL SIZES A SPECIALTY

Corrugated, Crimped and Clap-Board Iron Roofing & Siding.



Iron Buildings, Roofs, Doors, Shutters, Cornices
Skylights, Bridges, &c.

MOSELEY IRON BRIDGE AND ROOF CO.,
Office, 5 Day Street, Room 13, NEW YORK.

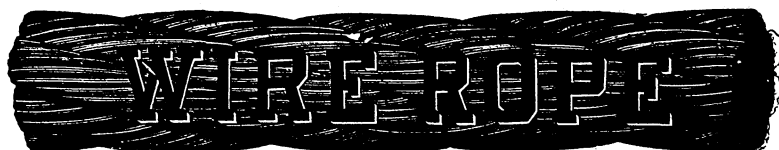
A. LESCHEN & SONS' ROPE CO.,

MANUFACTURERS OF



ST. LOUIS, MO.

CORRESPONDENCE INVITED.



Williamsport Wire Rope Co., Williamsport, Pa.



WAREHOUSES: 87 Liberty St., New York.

WORKS
Wilkesbarre, Pa.

NEW HAVEN WIRE MFG. CO.,

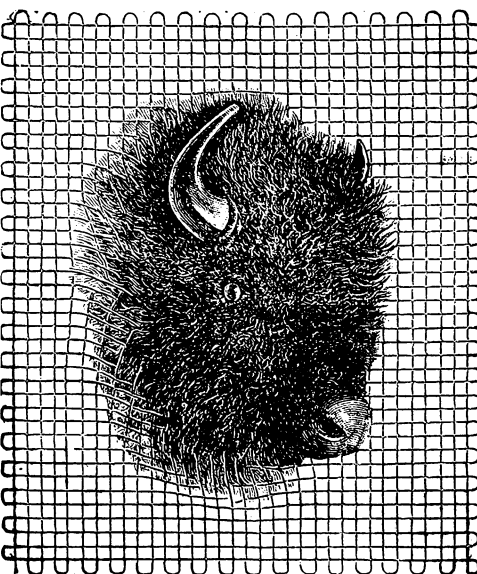
Manufacturers of

WIRE

in great variety.

NEW HAVEN,

CONN.



Wire Cloth

AND WIRE GOODS

Of All Kinds.

WE WILL SEND YOU
A FULL LINE OF

Wire Cloth Samples,

WITH AN ORDER OF

\$10.00. Very Handy.

Buffalo Wire Works.

SCHEELER & SONS,

143 Main St., Buffalo, N. Y.

Practical Electric Bell Fitting:

A TREATISE ON THE FITTING-UP AND THE MAINTENANCE OF ELECTRIC BELLS AND ALL THE NECESSARY APPARATUS

By F. C. ALLSOP.

CONTENTS.—Wiring, Soldering and Joining Wires and Earth Connections. Pushes, Pulls,
Contacts and Switches. Bells, Relays and Indicators. Batteries. The Magneto Bell. Connect-
ing-up. The Detector and Localizing Faults. Portable Sets. Index.
112 pages, with 141 illustrations, 12mo, cloth, \$1.25.

DAVID WILLIAMS, Publisher and Bookseller,

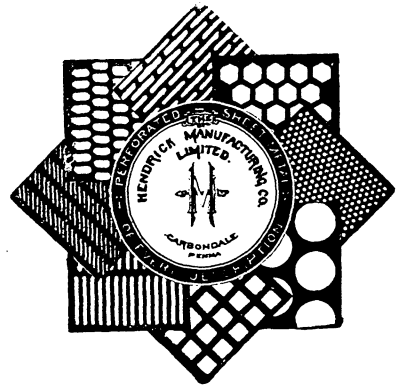
96-102 Reade Street,

NEW YORK

HOWARD & MORSE
45 FULTON ST.,
NEW YORK.
HEAVY MINING
COPPER,
BRASS,
STEEL
OR IRON
WIRE CLOTH.

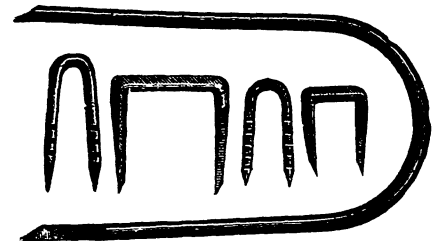
ALSO
MANUFACTURERS OF
GENERAL
WIRE WORK.
 Window Guards,
 Stable Fixtures,
 RAILINGS,
 Sand Screens
 Coal Screens
 Etc.

PERFORATED SHEET METALS
OF EVERY DESCRIPTION.

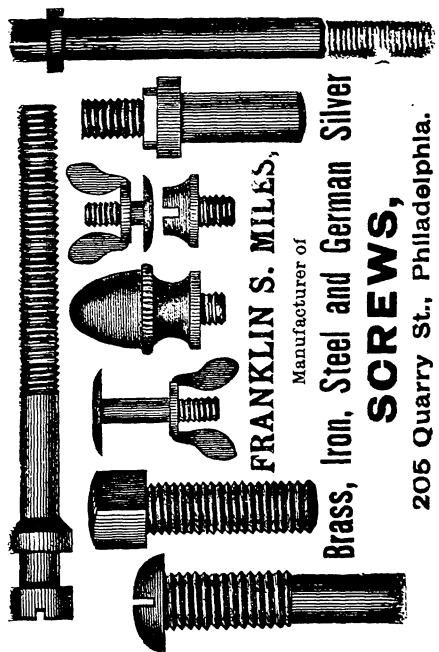


THE HENDRICK MFG. CO., LTD.,
CARBONDALE, PA.

E. H. Titchener & Co.,
BINGHAMTON, N. Y.
 —MANUFACTURERS OF—



STAPLES in All Varieties,
 Double-Pointed Tacks, Bed Links, Etc.
Blind Staples a Specialty.



Established 1830.

THE PLYMOUTH MILLS.
Rivets, Trunk Nails,
Tacks Clout Nails,
Burrs, Wire Nails.
PLYMOUTH, MASS.

BORDEN & LOVELL,
70 AND 71 WEST STREET
NEW YORK.

Steel, Iron and Wire Nails.

WICKWIRE BROTHERS, **CORTLAND, N. Y.**
Wire Cloth and Wire Goods,
 MANUFACTURERS OF



Coal Sieves,
 Flour Sieves,
 Corn Poppers,
 Dish Covers,
 Metallic
 Coal Sieves.

NEW PROCESS
Cortland
POWER LOOM
WIRE CLOTH.

Every roll wrapped in Pink Paper and has our name on label.

Kilmer Manufacturing Co. ————— **Newburgh, N. Y.**

Manufacturers of **BALE TIES** For Baling Hay, Straw, Rags, Excelsior, &c.

ALSO WIRE RODS, BARB WIRE, COILED STEEL WIRE, WIRE STAPLES, GALVANIZED WIRE, ORNAMENTAL FENCING, &c., &c.

Western Warehouse 543 and 545 State Street, Chicago, Ill.
 Western Office 21 Quincy Street, Chicago, Ill.
 New York Office, 111 Water Street, New York City.
 Works and General Office, Newburgh, N. Y.

THE COST OF MANUFACTURES
 —) AND THE (—
ADMINISTRATION OF WORKSHOPS,
 Public and Private.

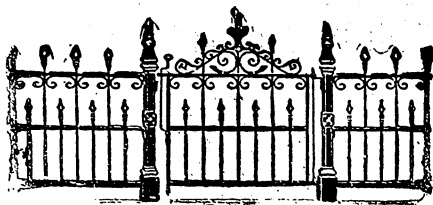
BY CAPT. HENRY METCALFE.

322 Pages; 6¼ x 9¼ inches. CLOTH, \$5.00

This work is an effort to correct some of the wrong, and consequently unprofitable, methods of conducting manufacturing establishments, and proposes plans for more correct ones. A system of mechanical bookkeeping, based on the card catalogue method, dispensing with the use of books, by which the cost of manufactures may be promptly determined, either in gross or detail, as to component parts and operations thereon. Comprising a simple method of recording all dealings with material which relate to its procurement, expenditure or possession. Applied, with numerous practical illustrations, to the trust, accountability for public property and funds required of the U. S. Ordnance Department, with a review of its present practice. Illustrated with tables, forms of cards, etc.

Any Book Published Sent, Post-paid, on Receipt of the Price, by

DAVID WILLIAMS, Publisher and Bookseller
96-102 Reade Street, New York



Reliance Wire & Iron Works, MILWAUKEE, WIS.

ARCHITECTURAL WIRE AND IRON WORKERS.

Wire Cloth, Galvanized Fencing and Netting, Wire Lath, Wire and Iron Fences and Railings, Window Guards, Stable Fixtures, Bank and Office Railings, all kinds of Brass, Wire and Iron Work for Buildings and Offices.

SEND FOR ILLUSTRATED CATALOGUE.

CLINTON WIRE CLOTH CO.

— Manufacturers of Every Description of —

WIRE CLOTH, HEX. NETTINGS, WIRE LATH AND FENCING.

Perforated Metals, GALVANIZERS AND TINNERS OF Wire Cloth and Nettings.

Clinton "Standard" (Number 33 Wire) Painted Window Screen Wire Cloth.

FACTORY AND GENERAL OFFICE: CLINTON, MASS.

NEW YORK, 76 Beekman Street.

BOSTON, 199 Washington Street.

CHICAGO, 137 Lake Street

The Gilbert & Bennett Mfg. Co.

— MANUFACTURE —

Pearl Window Screen Wire Cloth.
Galvanized Steel Wire Cloth.
Galvanized Wire Poultry Netting.
"Cottage" Lawn & Garden Fencing.
The World's Web Wire Fencing.
Sieves, Riddles, Screens.
Gilbert's Rival Ash Sifters.
House Furnishing Wire Goods.

WIRE CLOTH, NETTING,
Fencing, Gates, Fencing Tools,
Wire Goods, Wire Work

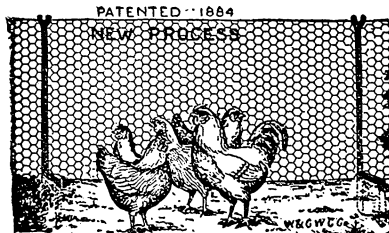
RAILINGS, WINDOW GUARDS.
WIRE LATHING WITH HAMMOND'S METAL FURRING.

44 Cliff Street,
NEW YORK.

148 Lake Street,
CHICAGO.

Factories, { GEORGETOWN, CONN
CHICAGO, ILLINOIS.
ESTABLISHED 1818.

WRIGHT & COLTON WIRE CLOTH CO., Worcester, Mas.



HARD STEEL WIRE

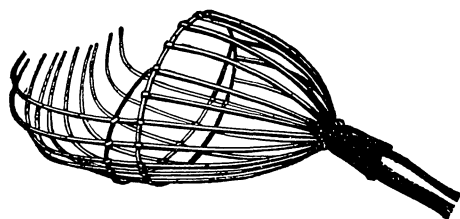
NEW PROCESS
HARD STEEL WIRE CLOTH AND NETTING
GALVANIZED
WIRE NETTING.

Patented March, 1884.
Patents Pending.

Painted Window Screen Wire Cloth,
WIRE LATHING, HOUSE FURNISHING WIRE GOODS

SEND FOR LATEST CATALOGUE.

"PENNSYLVANIA" FRUIT PICKER.



This Cut almost speaks for itself—the device being so much like the human hand shows at once the utility of the article.

AS A FRUIT PICKER IT HAS NO SUPERIOR.

It is made of Heavy Galvanized Wire, and easily adjusted to a pole.

It has been sold for several years, and the demand (as it is becoming known) is steadily increasing.

The difficulty of detaching fruit and securing it unbruised is apparent to every one so engaged. This overcomes the difficulty, and saves the finest fruit, which commands the highest prices.

THE LOW PRICE AT WHICH IT IS SOLD

Brings it within the reach of those who have but little fruit to gather as well as those who have large quantities.

Price per dozen, \$6.00.

It will gather Apples, Peaches, Pears, Etc.

MANUFACTURED BY

PENNSYLVANIA WIRE WORKS,

EDWARD DARBY & SONS, - 233-235 Arch St., Phila., Pa.

PAINTED AND GALVANIZED WINDOW SCREEN CLOTH.

IRON, STEEL, BRASS AND COPPER WIRE CLOTH.

MANUFACTURERS
THE ROEBLING
STANDARD
WIRE
LATHING.

NEW JERSEY
WIRE CLOTH CO.

"JERSEY"
POULTRY
NETTING
AND FARM
FENCING.

TRENTON, 117 and 119 LIBERTY STREET,
NEW JERSEY.

NEW YORK.

171 and 173 LAKE STREET,
CHICAGO.

25 and 27 FREMONT STREET,
SAN FRANCISCO.

FOUNDERS **P. P. EMORY MFG. CO.**
 IN BRASS AND COM-
 POSITION, HEAVY
 AND LIGHT CAST-
 INGS.

— ESTABLISHED 1850. —
SPRINGFIELD, MASS.
Good Work, Fair Prices.
CORRESPONDENCE SOLICITED.

COPPERSMITHS,
 and Manufacturers of
COPPER AIR CHAMBERS,
EXPANSION PIPES
AND COILS.



Builders' Wire and Iron Work.

— ILLUSTRATED CATALOGUE FREE. —

Roof Cresting, Weather Vanes, Wire and Iron Fences, Stable Fixtures, Fire Escapes, Iron Stairs Columns, Window Guards, Counter Railing, Jail Cells, Flower Pot Stands, Etc.

MENTION THIS
PAPER.

E. T. BARNUM, DETROIT, MICH.

THE VAN DORN IRON WORKS CO., Cleveland, Ohio.



Office and Salesroom, 157 1/2 Euclid Ave.,
MANUFACTURERS OF
WROUGHT IRON FENCE and RAILING.
 Stable Fixtures, Crestings, Terminals, Wire Office and
 Counter Railing, Lawn Seats and Vases.
Iron and Steel Jail Cell Work. Orna-
mental and Structural Ironwork.



"HARTMAN"
FLEXIBLE STEEL WIRE MATS

Cleanly, Odorless, soft as Carpet.

Imitations and infringements there have been, but nothing that can compare with the **"HARTMAN" MATS** in merit. Write for prices.

HARTMAN MFG. CO., Works, Ellwood City, Lawrence Co., Pa.

BRANCHES: | 277 Broadway, New York.
 | 508 State St., Chicago, Ills.

SECURITY WAREHOUSE,
EAST ST. LOUIS, ILL.,

Do a general storage business. Rates reasonable. Insurance low.

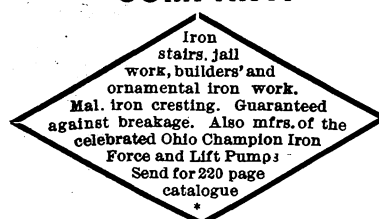
Located on B. & O. and Pennsylvania Lines.

Direct connection with 26 Railroads entering St. Louis or East St. Louis, and all Ohio Missouri and Mississippi River Lines.

St. Louis Rates of freight to all points **West** of Mississippi River. To points **East** less. In addition to storage we do a general distributing business on commission. We have representatives traveling all over the West and South.

Correspond with us.

CHAMPION IRON
COMPANY.



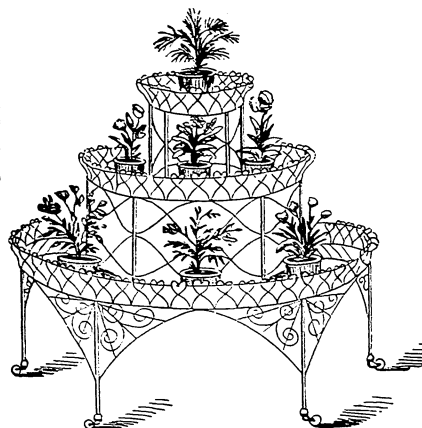
The largest Iron Fence and Railing Works in the U. S.
KENTON, OHIO.

E. PHILLIPS & SONS
 SOUTH HANOVER, MASS.

TACKS

F. R. EMMONS & BRO.
 21 WARREN ST., NEW YORK.

FLOWER STANDS.



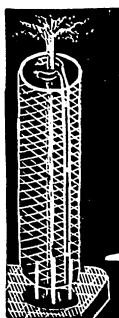
Interior Wire Work. Bank and Office Wire Work. Brushes.
Wire Goods of every description.

CORN POPPERS.

MADE BY

CINCINNATI MFG. CO., CIN., O.
 WRITE FOR CATALOGUE.

Tree Protector.



McCallips' Pat.

The Best Tree Guard on the Market. Price \$12 per doz. Discount to the Trade.

Iron Fences, Wire Fences and Builders' Wire Work.

McCallip Fence & Wire Works

485 Oak Street,
COLUMBUS, - OHIO.

STEEL, IRON, COPPER, ZINC, BRASS AND TIN PERFORATED.

—FOR—

Grain Cleaning Machinery;
Woolen, Cotton, Paper Pulp, Rice,
Flour and Oil Mills;
Distilleries, Sugar and Malt Houses;
Gas, Water, Brick and Tile Works, Filters, Ventilators, &c;
Oil, Gas and Vapor Stoves, Lanterns, Lamps, etc.

Perforated Filter Press Plates
For Paraffine Wax, Cotton-Seed Oil, Sugar and other purposes.



THE HARRINGTON & KING PERF. CO.,
Main Office & Works, 224 to 240 Union Street, CHICAGO, ILL., U. S. A.
Eastern office, No. 284 Pearl St., New York.

Screen Plates for Coal, Coke, and Ore Separators, Jigs, Trommels, Washers and Sizers.

Heavy Steel and Iron Plates and Cylinders for Coal and Coke Breakers, Ore, Stone, Phosphates & Gravel Screens.

For Railroads, Locomotive and Car Builders.

Prices and Samples on Application.

ALUMINUM or MANGANESE BRONZE
SCREEN PLATES
TO WITHSTAND ACTION OF AGGRIATED WATERS
WITH
Hardness and Life of Best Steel.

HENDRICKS' ARCHITECTS AND BUILDERS' GUIDE

—:AND:—

CONTRACTORS' DIRECTORY OF AMERICA

—:FOR:—

BUILDERS, CONTRACTORS, MANUFACTURERS AND DEALERS IN ALL KINDS OF BUILDING SUPPLIES.

A Complete Directory of all the Construction Industries of the Country, containing over 170,000 Names. Addresses and Business Classifications, comprising Builders and Contractors of Material and Construction in the Building and kindred Industries. With Full lists of the Manufacturers of and Dealers in Everything employed in the Manufacture of Material and Apparatus used in these Industries—from the Raw Material to the Manufactured Article, and from the Producer to the Consumer.

Architects; Arch'l Wood Workers; Car Builders; Carpenters; Builders and Contractors of all kinds; Blast Furnaces; Brick Mfrs. (Common, Fire, Ornamental, Paving, Pressed, &c.); Boiler Mfrs.; Bridge Builders; Builders' Hardware; Mfrs. of Building Iron of all kinds; Cement; Cornices; Dumb Waiters; Engine Mfrs.; Engine and Boiler Dealers; Electric Lighting Co.'s Dynamos and Motors; Elevators; Engineers (Civil and Mechanical); Electricians; Fire Escapes; Furnaces; Fire Proof Building Material; Dredging Machinery and Contractors; Dock Builders; Contractors for Railroads (Steam, Electric, Elevated, Cable, Street, &c.); Granite Producers, Dealers and Workers; Granite and Marble Monument Workers and Dealers; Iron and Steel Ceiling and Siding; Iron and Steel Roofing; Lathing (Iron, Steel and Wire); Lightning Rods; Mantel Mfrs. (Iron, Marble, Onyx, Slate, Wood, &c.); Mantels, Grates, Fenders, Tile, &c.; Marble Producers, Marble Dealers and Workers; Mason and Builders' Materials; Paint Mfrs.; Paint, Oil and Glass Dealers; Plumbers' Specialties; Plumbers, Gas and Steam Fitters; Plumbers' Gas and Steam Fitters' Supplies; Roofers and Roofers' Supplies; Steam Supplies (Gauges, Feed Water Heaters, Traps, Valves, Pipe and Boiler Coverings, Cast and Wrought Iron Pipe and Fittings); Steam and Hot Water Heating Apparatus; House Heating Boilers and Heaters; Steam and Hot Water Heating Contractors; Railroad Purchasing Officials; Radiators; Rolling Mills, &c.; Sashes, Doors and Blinds; Skylights; Stone Dealers; Terra Cotta; Varnishes; Ventilators; Vault and Sidewalk Lights; Weather Vanes; White Lead Mfrs.; Wire Mfrs. and Workers; in fact everything connected with the Building Industries.

FOR THE YEARS 1893-94.

PRICE . . . FIVE DOLLARS.

SENT, POSTPAID, ON RECEIPT OF THE PRICE, BY

DAVID WILLIAMS, Publisher and Bookseller,
96-102 Reade Street, N. Y.

The Berlin Iron Bridge Co.,

Engineers,
Architects
and
Builders
in
Iron
and
Steel

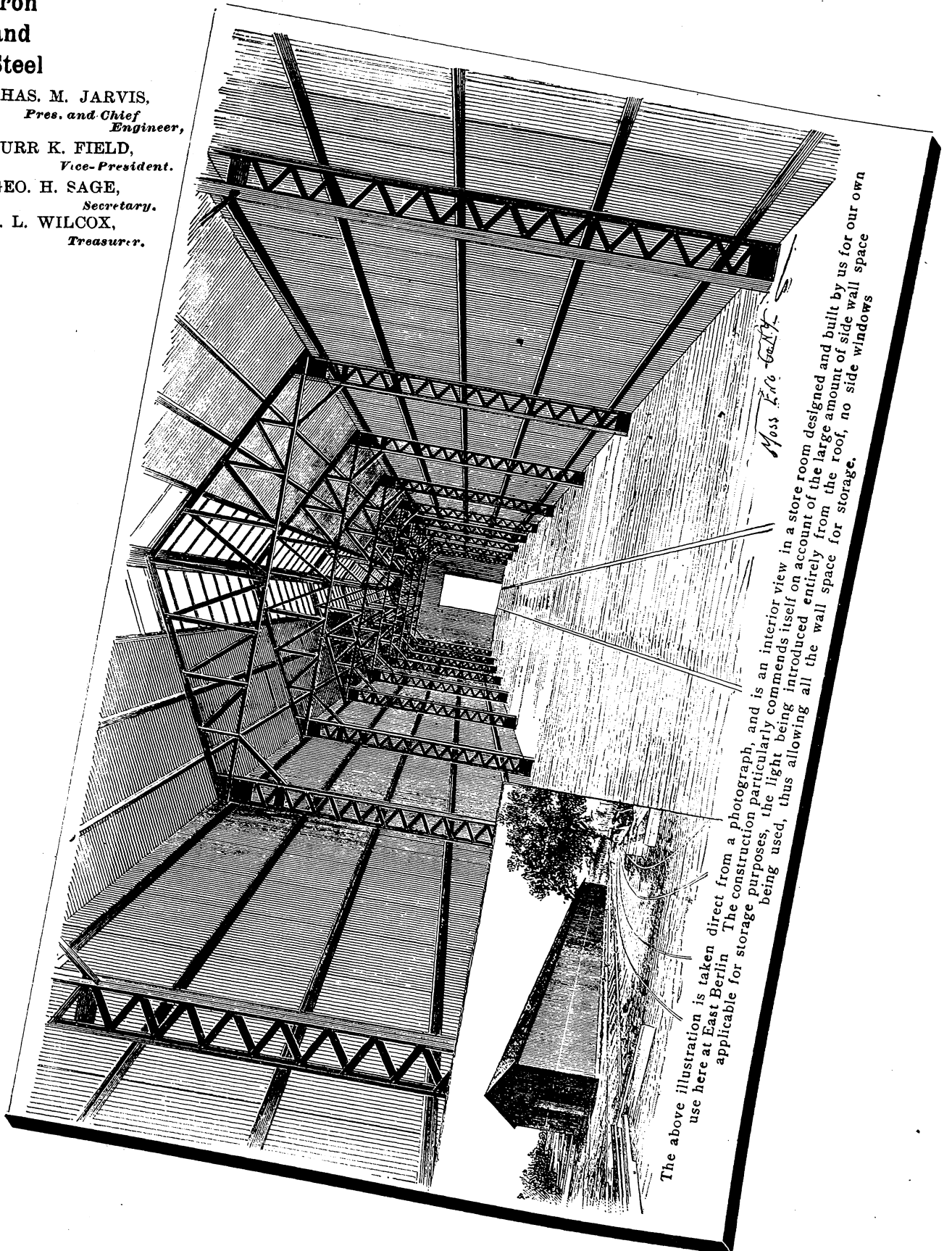
OFFICE AND WORKS:
**EAST BERLIN,
CONN.**

CHAS. M. JARVIS,
Pres. and Chief Engineer,

BURR K. FIELD,
Vice-President.

GEO. H. SAGE,
Secretary.

F. L. WILCOX,
Treasurer.



The above illustration is taken direct from a photograph, and is an interior view in a store room designed and built by us for our own use here at East Berlin. The construction particularly commends itself on account of the large amount of side wall space being used, thus allowing all the wall space for storage.

SEND FOR ILLUSTRATED CATALOGUE.

ATLAS TACK CORPORATION.**508 SEARS BUILDING, BOSTON, MASS., U. S. A.**

BRANCHES: **DUNBAR, HOBART & CO., WHITMAN, MASS.**
ESTABLISHED IN 1810.
A. FIELD & SONS, TAUNTON, MASS.
ESTABLISHED IN 1827.
AMERICAN TACK CO., FAIRHAVEN, MASS.
ESTABLISHED IN 1867.

LORING & PARKS, PLYMOUTH, MASS.
ESTABLISHED IN 1842.
TAUNTON TACK CO., TAUNTON, MASS.
ESTABLISHED IN 1864.
OLD COLONY RIVET CO., PLYMOUTH, MASS.
ESTABLISHED IN 1866.

MANUFACTURERS OF

Tasks, Brads, Small Nails, Shoe Nails, Lining and Saddle Nails, Tufting Nails and Buttons, Wire Nails, Finishing Nails, Patent Brads, Hungarian Nails, Steel Shanks for Boots and Shoes, Wire Tacks, Escutcheon Pins, Eyelets, Glaziers' Points, Rivets, Burrs, Furniture Springs, Pilgrim Spring Bed, and other articles.

We have the largest and only complete and fully assorted stock in the world. Our manufacturing facilities are unequalled. The foregoing well known brands we continue to use, and either will be furnished upon request. We have long distance telephone connection with our New York store and our factories.

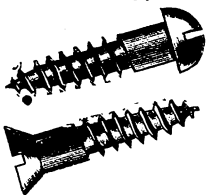
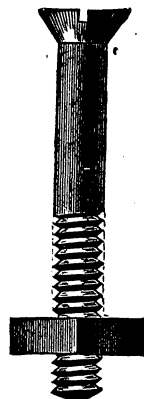
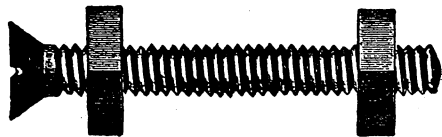
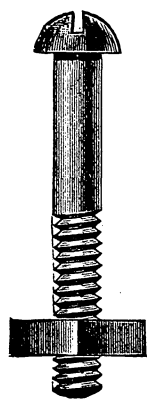
MAIN OFFICE, 508 SEARS BUILDING, 199 WASHINGTON ST., BOSTON, MASS.

BRANCH OFFICE & WAREHOUSE, 31 WARREN ST., NEW YORK.

BRANCH OFFICE & WAREHOUSE, 239 & 241 LAKE ST., CHICAGO, ILL.

BRANCH OFFICE & WAREHOUSE, 408 MARKET ST., SAN FRANCISCO, CAL.

BRANCH OFFICE & WAREHOUSE, 406 COMMERCE ST., PHILADELPHIA, PA.

THE NATIONAL SCREW AND TACK CO.,**—MANUFACTURERS OF—**

Wood Screws, Machine Screws, Stove Bolts, Tire Bolts, Sink Bolts, Tacks, Trunk, Clout and Small Nails.

CLEVELAND, OHIO.

Tacks, Wire Nails and Brads, Hoop Nails, Staples, Silver and Japanned Lining and Saddle Nails, Double Pointed Tacks, Slating and Roofing Nails.

BONNIE BLUE TACKS.
100 Kegs in a Box, Assorted 3 to 12 oz. Retails 2 Kegs for 5 cents.

PARISIAN GILT NAILS.
20 papers in Carton. 5 cent seller.

MONARCH WOOD KEG CARPET TACKS.
5 cent seller.

"JUST ENOUGH"
Brass Nails. 100 Nails in a Paper, just enough to top a pair of shoes; 20 papers in Carton. 5 cent seller.

DOUBLE ENOUGH
Cobblers' Nails. 200 Nails in a Paper, 20 Papers in Carton. 5 cent seller.

BILL NYE BRAD BOX.

168 Papers Wire Brads, a sorted 1/2 to 2 in Each Paper just right to retail for 5 cents.

QUARTER SIZE CUT OF

**Horrock's Metal Mat,**

Patented July 13, 1893.

MANUFACTURED BY

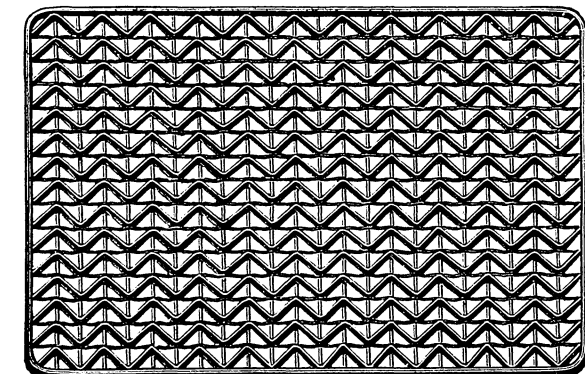
JOSHUA HORROCKS,**45 CLIFF STREET - NEW YORK CITY, N. Y.**

It has more superior qualities than any mat made. Its advantages can readily be seen by its construction. It will not break or wear out, and is considered by impartial judges to be the best now on the market. It sells on sight and is galvanized after made and is reversible. Suitable for Elevated or Surface cars, and is recommended by the best medical authorities. Made in 8 sizes.

No. 1, Size 16x24. No. 2, Size 18x30. No. 3, Size 22x36. No. 4, Size, 24x48.
" 5, " 30x48. " 6, " 36x48. " 7, " 36x60. " 8, " 36x72.

Extra Sizes Made to Order.

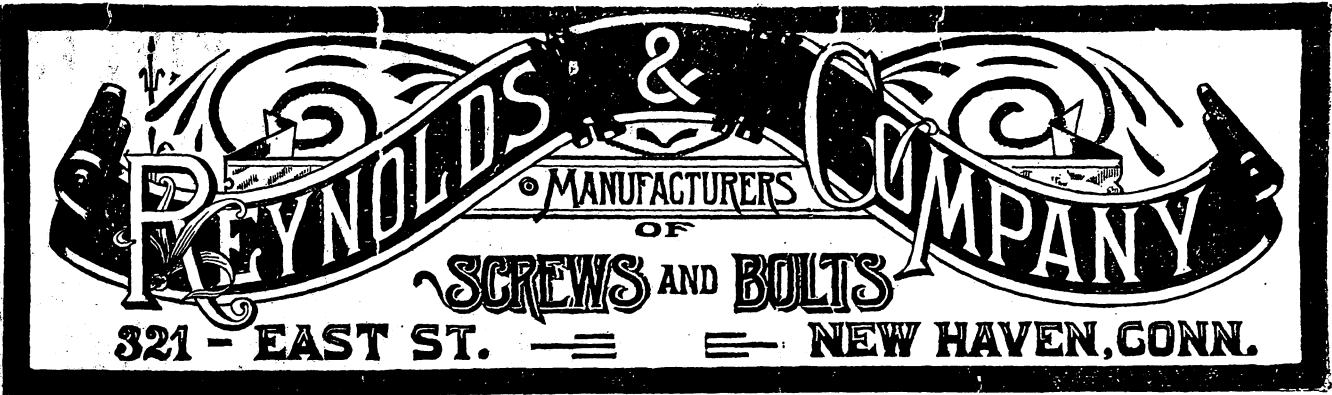
Send for Price-List.

**LOW PRICES**

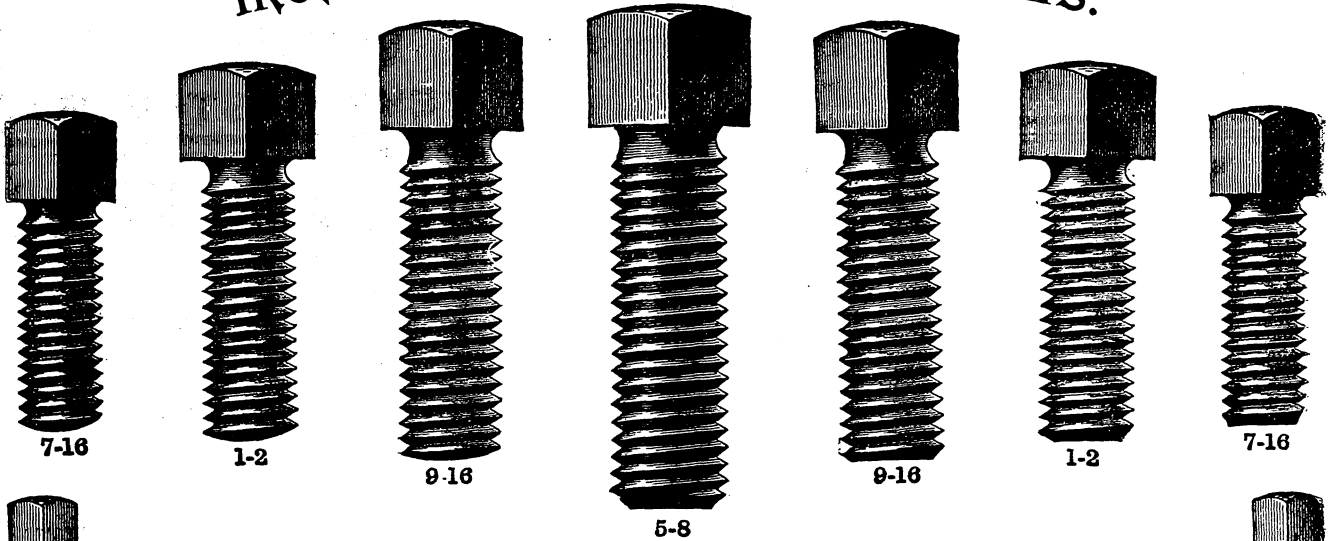
For every kind of fancy or staple wire goods, for interior or exterior use.

Send for Prices and Catalogue "B."

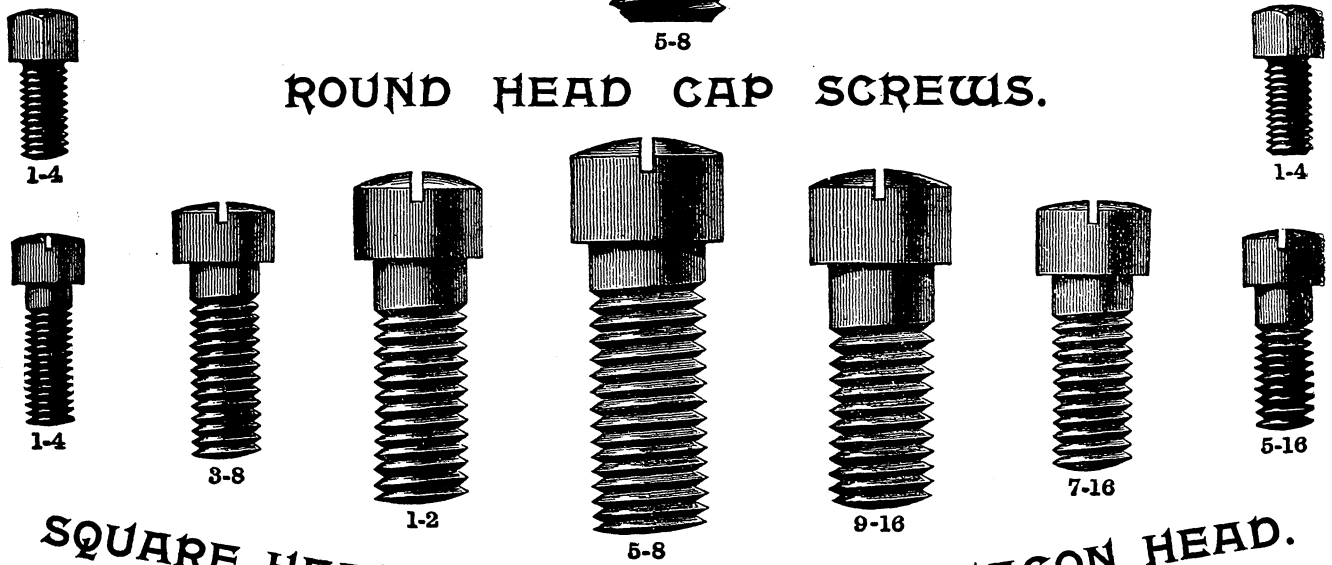
LANGE FENCE and WIRE CO., - - St. Louis, Mo.



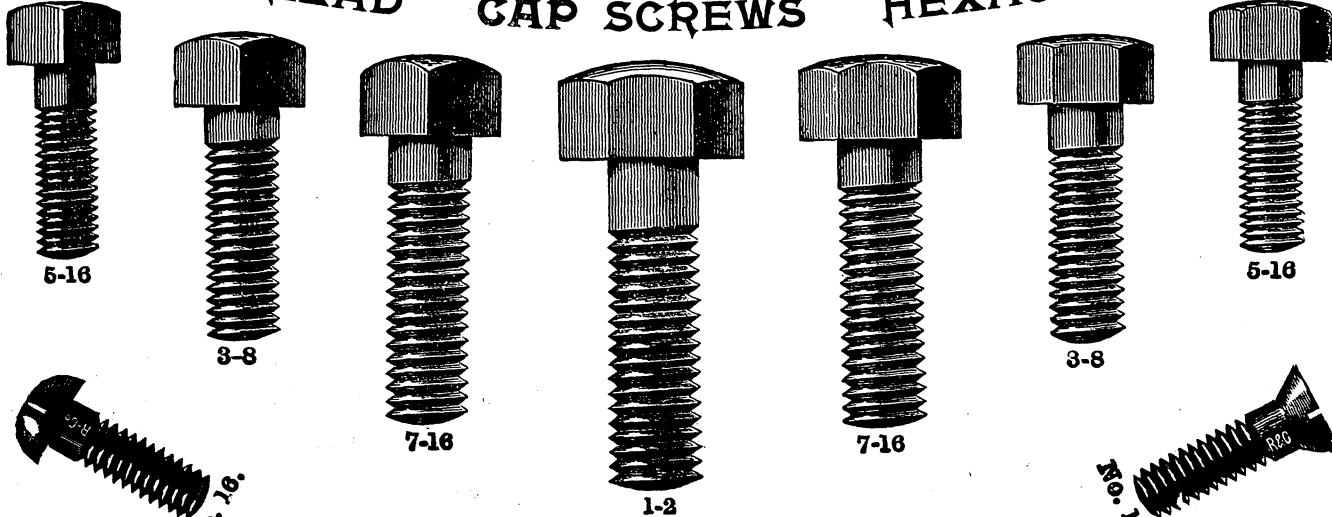
IRON AND STEEL SET SCREWS.



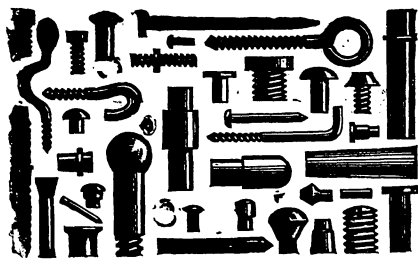
ROUND HEAD CAP SCREWS.



SQUARE HEAD CAP SCREWS HEXAGON HEAD.



SEND FOR CATALOGUE.



IRON AND BRASS RIVETS,

STUDS, PINS, SCREWS, &c.,

For Manufacturers of Light Hardware.

BLAKE & JOHNSON, WATERBURY, CONN.

NEW CASTLE WIRE NAIL CO.,

MANUFACTURERS OF



WIRE RODS AND WIRE.

Office and Works,

NEW CASTLE, PA.

OXFORD

IRON AND NAIL CO.,
Cut Nails

AND
SPIKES.

J. S. SCRANTON, Sales Agent
81, 83 and 85 Washington Street,
NEW YORK.

W. S. ESTEY,

No. 65 FULTON ST., NEW YORK,

MANUFACTURER OF

WIRE CLOTH

Of Brass, Copper, Iron, Galvanized and Steel Wire of all meshes and grades. For Mining, Milling and all other purposes. Locomotive Spark Wire Cloth, &c.,

—AND—

WIRE WORK

For Bank, Office and Counter Railing, Store Fronts Window Guards, &c.

Galvanized Twist Netting.

Oliver's Patent Decoy Rat Traps.

S T Pat. Adjustable Foundry Riddles.

S T Sand Screens.

SEND FOR CATALOGUE.

PHILLIPS, TOWNSEND & CO.

North Penn Junction, Philadelphia.

WIRE NAILS, - - -

- - NORWAY RIVETS

Rivets marked "P" are not of our make. We make only first-class NORWAY IRON RIVETS

COBB & DREW,

PLYMOUTH, MASS.

Manufacturers of Norway Iron Rivets, Brass and Copper Rivets, Burrs, Washers, D. P. Tacks and Staples.

New York Agency, James S. Henderson, successor to Disoway & Henderson, Hardware.

Agents for Philadelphia Star Carriage and Tire Bolts.



THE SALEM WIRE NAIL CO.

MANUFACTURERS

WIRE NAILS,

Works: SALEM, O.; FINDLAY, O.

General Office: - SALEM, OHIO.

BRANCH OFFICES:

Room 28, 277 Broadway, New York.

415 Phenix Bldg., Chicago.

200 Amer. Central Bld'g, St. Louis.

19-20 Ainsworth Block, Portland, Ore.

38 Pickering Bld'g, Cincinnati, O.

CLENDENIN BROS., BALTIMORE, MD.

STOCK SIZES OF

SOLDERING COPPERS,

MADE OF BEST LAKE COPPER AND ULSTER IRON.

TINNER'S POINTED PATTERN HOOKED HANDLES

BOTH LIGHT AND HEAVY HANDLES.

(1, 1½, 2, 2½, 3, 3½, 4, 5, 6, 7, 8, 10 lbs., per pair.

TINNER'S POINTED PATTERN RIVETED HANDLES.

(1, 1½, 2, 2½, 3, 3½, 4, 5, 6, 7, 8 lbs., per pair.

ROOFING.

WITH HANDLE AND SHIELD.

10, 11, 12, 13, 14, 15 and 16 lbs., per pair.

PLUMBER'S SWIVEL HATCHET PATTERN.

2, 3, 4, 5, 6, 7, 8 lbs., per pair.

FLAT PATTERN HOOKED HANDLES.

FOR MAKERS OF TINWARE.

(1, 1½, 2, 2½, 3, 3½, 4, 5, 6 lbs., per pair.

FLOATING PATTERN FOR CANMAKERS.

4, 5, 6, 7, 8, 10 lbs., per pair.

CAPPING PATTERN FOR FRUIT AND OYSTER PACKERS.

5, 6, 7, 8, 10 lbs., per pair.

HATCHET PATTERN FOR CANMAKERS.

4, 5, 6, 7, 8, 10 lbs., per pair.

SPECIAL COPPERS MADE TO ORDER PROMPTLY.

The quality of our Tinner's Pattern Light and Heavy Handles is identically the same, the only difference is that the Light Pattern has less iron in the handles than the Heavy Pattern.

WE ARE PREPARED TO MAKE 400 SOLDERING COPPERS PER DAY.

BRASS and IRON MACHINE SCREWS

—AND—

RIVETS.

NEW ENGLAND
SCREW CO.,

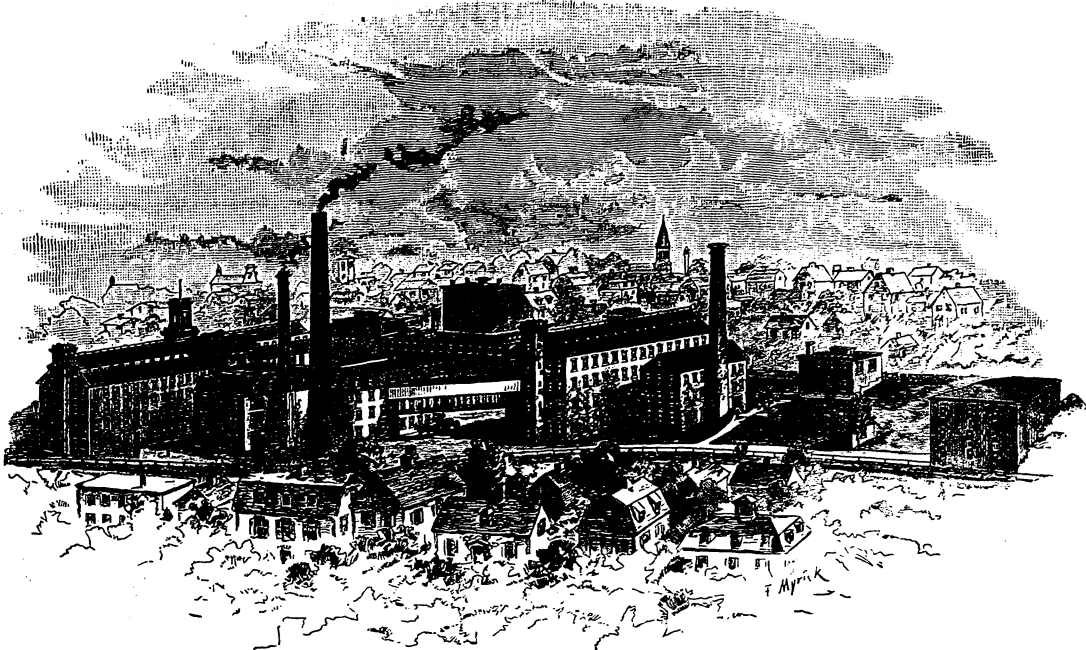
14 Mt Washington Ave.

BO TON, MASS

For
Electric Trade,
Chandelier Trade,
Hardware Trade.

American Screw Company,

PROVIDENCE, R. I.



EAGLE MILLS, PROVIDENCE, RHODE ISLAND, U. S. A.

MANUFACTURERS OF

WOOD SCREWS,

In Iron, Brass, Bronze and all Varieties
of Finish.

COACH SCREWS,

MACHINE SCREWS,

RAILROAD SCREWS,

HAND RAIL SCREWS,

SIDE KNOB SCREWS,

LOCK CAP SCREWS,

DOWEL SCREWS,

CHANDELIER SCREWS,

RIVETS, BURS,

TIRE BOLTS,

STOVE BOLTS,

SLEIGH SHOE BOLTS,

SINK BOLTS,

STOVE RODS,

POINTED WIRES,

TAPPED NUTS,

WIRE NAILS,

DOWEL PINS,

TAPS FOR MACHINE SCREWS,

TAPS FOR STOVE BOLTS.

**COLD
FORGED**

Rogers Drive Screws,
Side Knob Screws,
Lock Cap Screws,
Machine Screws,
Stove Bolts,
Forged Wood Screws,
Threaded Wires,
Fluted Tire Bolts.

American Screw Company,

PROVIDENCE, R. I.

Chicago Store, No. 19 Lake St.

EUROPEAN AGENTS, THOMAS & STIRLING, Liverpool.

CONSOLIDATED STEEL AND WIRE CO.

GENERAL OFFICES, THE ROOKERY, CHICAGO, ILL.

Branch



Offices.

ST. LOUIS, MO., 1935 Papin Street.
PITTSBURGH, PA., Westinghouse Building.
NEW YORK CITY, N. Y., Havemeyer Building.
SAN FRANCISCO, CAL., 81 Crocker Building.

BARBED WIRE.

WIRE RODS and PLAIN WIRE of Every Description.

WIRE NAILS.

Bale Ties, Fence Staples, etc.

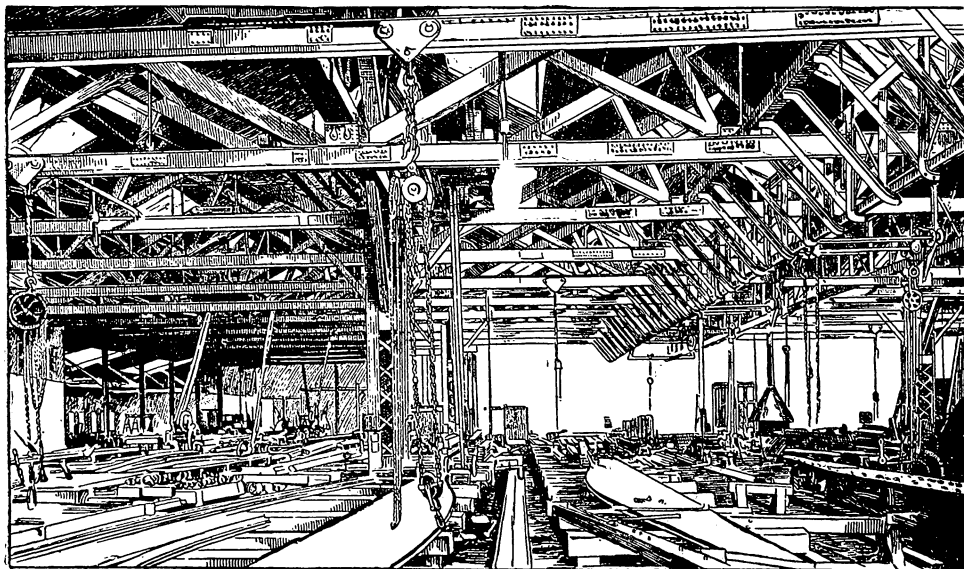
MILLS LOCATED AT

ST. LOUIS, MO. PITTSBURGH, PA. ALLENTOWN, PA.
JOLIET, ILL. LOCKPORT, ILL.

WROUGHT IRON BRIDGE CO. {

CANTON, OHIO.
NEW YORK CITY.
CHICAGO, ILL.
KANSAS CITY, MO.

COMMUNICATE WITH NEAREST OFFICE.



Iron Buildings, Roofs and
General Structural Work
in Iron and Steel, Ma-
chine Shops, Foun-
dries, Power
Houses, &c.

The above is a cut of our new works. The main building is 256 feet square and is fitted with improved machinery for handling all classes of Bridge and Structural work. All machinery is operated by electricity from our own plant.

METAL PLATE WORK. Its Patterns and Their Geometry.

Also notes on metals and rules in mensuration for the use of tin, iron and zinc plate workers, &c.

By C. T. MILLIS. Second edition, revised and enlarged. 377 pages, 314 illustrations.

12mo Cloth, . . . \$3.50.

Sent postpaid, upon receipt of price by DAVID WILLIAMS, Publisher and Bookseller, 96-102 Reade St., N. Y.

Gautier Steel Department of Cambria Iron Co.,

JOHNSTOWN, PA.

—: MANUFACTURERS OF:—

MERCHANT BAR STEEL:

Including Tire, Toe Calk, Machinery, Carriage Spring, Railroad Spring, Hoe, Rake, Fork, etc.

AGRICULTURAL STEEL AND SHAPES:

Finger Bars, Knife Backs, Rake Teeth, Bundle Carrier Teeth, Tedder Forks and Springs, Spring Harrow Teeth, Harrow (Drag) Teeth, Seat Springs, etc.

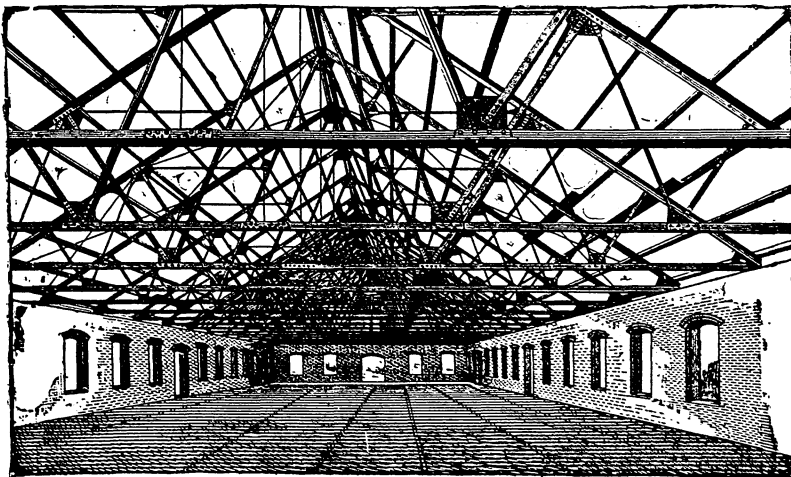
PLOW STEEL:

Flat and Finished Plow Shapes, Digger Blades, Slabs, (Penn and Pernot), Hammered Lay, Rolled Lay, etc.

COLD ROLLED STEEL SHAFTING.**STEEL HARROW DISCS.****CAMBRIA LINK BARB WIRE.**New York Office,
102 Chambers St.Philadelphia Office,
S. W. Cor. 5th & Commerce Sts.Chicago Office,
209 Phenix Building.Southern Office,
Chattanooga, Tenn.**IRON AND STEEL BRIDGES, ROOFS AND BUILDINGS****BOSTON BRIDGE WORKS,**

Engineers and Builders,

MASON BUILDING, BOSTON, MASS.



Roof of Machine Shop at Portsmouth (N. H.) Navy Yard.

INQUIRIES SOLICITED.D. H. ANDREWS, Prop'r,
J. R. WORCESTER, Chief Engr.A. S. MILLER, Jr., Sec'y.
R. H. BROWN, Con. Engr.

IMPROVEMENTS PATENTED 1890 IN THE U. S., CANADA AND EUROPE.

FIRE-PROOF. Easily applied by anyone. Send for Samples and Descriptive Price List.**H. W. JOHNS MANUFACTURING COMPANY,**

H. W. Johns' Asbestos Fire and Water-Proof Sheathing, Building Felt, Steam Packings, Boiler Coverings, Liquid Paints, Roof Paints, Roof Cement, Fire-Proof Paints, etc.

87 MAIDEN LANE, NEW YORK.

JERSEY CITY, CHICAGO, PHILADELPHIA, BOSTON, LONDON.

IRON AND STEEL ROOFING,

Corrugated Iron, Galvanized Eave Trough and Conductor Pipe, Roofing Paints, etc.

Cambridge Roofing Co., Cambridge, O.**The Leading Authority on
Business Law.****PARSONS'
THE LAWS
OF BUSINESS,**For all the States and Territories of
the Union.

By Theophilus Parsons, LL.D.

864 pages, 6 x 9 inches; full leather \$4.50

This is a work almost indispensable to every business man, as a guide in transactions which are occurring constantly.

It constitutes a library of law on daily business affairs and is used for constant reference by many of the leading concerns throughout the country.

The volume treats fully and clearly of contracts, sales, agency, agreements and assessments, stoppage and transitu, considerations, limitations, notes and bills of exchange, interest and usury. Embraces chapters on commercial law in general, bonds, assignments, guaranty, the statute of frauds, receipts and releases, payment, partnership, arbitration, carriage of goods and passengers by railroad and other carriers, hotel keepers, patents, copyrights, statute of limitations, the law of place, shipping, marine, fire and life insurance, deeds of land, mortgages of land, mortgages of personal property, leases, liens of mechanics and material men, the recovery of debts, wills, executors and administrators, guardians, and the legal rights of farmers, &c. Also abstracts of the laws of all the States and Territories relating to the collection of debts, usury, the execution and acknowledgment of deeds, witness required to wills, holidays and days of grace, mechanics' liens, chattel mortgages, and nearly 300 approved forms which have been tested in courts.

Sent prepaid on receipt of price by

DAVID WILLIAMS,

Publisher and Bookseller,

96-102 READE ST. NEW YORK.

Lukens Iron and Steel Co. INCORPORATED 1890.

The First to make Boiler Plates in America.

Chas. Huston, Pres. A. F. Huston, Vice-Prest. C. L. Huston, Genl. Mgr. Robt. B. Haines, Jr., Secy. Jos. Humpton, Treas.

STEEL AND IRON PLATES, ALSO SHEETS

TO EXTREME DIMENSIONS.

WIDTHS UP TO 10 FEET.

THICKNESS, No. 12 GAUGE TO 1 1/4 INCHES.

— ESTABLISHED 1810. —

WORKS:

Coatesville, Pa.

NEW YORK OFFICE:

No. 28 Broadway.

PHILADELPHIA OFFICE:

62 & 64 Bullitt Bldg.

FRANK SAMUEL,
136-138 So. 4th St.,
Philadelphia.

LOW PHOSPHORUS

PIG IRON—.08 or under.
SCRAP—.08 or .05 or under.
ORE—For O. H. and Furnace Use.
MELTING BAR—
Open Hearth and Bessemer Billets,
Skep, Muck Bars and Scrap, Foundry and Bessemer Pig Iron,
Syracuse Tube Co.'s Tubes and Pipe.

THE PHOENIX IRON CO., 410 Walnut St., Philadelphia,

MANUFACTURE ALL THEIR PRODUCTS BOTH IN

WROUGHT IRON AND OPEN HEARTH STEEL.

Beams, Channels, Deck Beams, Angles, Tee-bars, Zee-bars and other shapes, Round, Flat and Square BARS of all sizes, Especially adapted for Bridge and Ship Builders, Fire-proof Buildings, Shafting and all Structural Purposes.
SPECIALTIES, in Wrought Iron or Steel:—Phoenix Columns and Upset Eye-Bars of all sizes, Roof Trusses, Girders, Joists and Built-up Shapes of every description.

AGENTS:—EDWARD CORNING & Co., 29 Broadway, NEW YORK; EDWARD CORNING & Co., 70 Kilby St., BOSTON, MASS; JAMES B. STOKES, 132 Market St., SAN FRANCISCO. WESTERN OFFICE: A. C. STITES, 981 The Rookery, CHICAGO.

POTTSVILLE IRON AND STEEL CO., POTTSVILLE, PA.

PHILADELPHIA OFFICE, 226 SOUTH 4th STREET

MANUFACTURERS OF ALL KINDS OF

STRUCTURAL IRON AND STEEL,

Viz., I Beams, Deck Beams, Channels, Tees, Angles, Plates and Bars; and also Open Hearth Steel Billets, Blooms and Slabs.

BREWERY, MALT AND ICE HOUSE CONSTRUCTION A SPECIALTY.

Designers and Constructors of Roofs, Trusses, Columns, &c.

TESTED CHAINS.

BRADLEE & CO., - EMPIRE CHAIN WORKS,

Beach and Otis Streets, PHILADELPHIA.

Chains for Foundry Cranes and Slings, "D. B. G." Special Crane Chain. Steel and Iron Dredging, Slope and Mining Chains. Ship's Cables and Marine Railway Chains

BARCLAY W. COTTON & CO.,

Successors to ESHERICK, COTTON & CO.,

Iron and Steel Merchants.

AGENTS FOR

AMERICAN WIRE GLASS MFG. CO.

418 Walnut St., PHILA.

MIFFLIN WHEELER. G. W. NICOLLS
Nicolls, Wheeler & Co.,

FORMERLY

SITES, WHEELER & CO.,

216 South Third St., Philadelphia, Pa

—DEALERS IN—

IRON AND STEEL SCRAP.

Pig Iron, Muck Bars, Charcoal Blooms, &c., &c.
Steel and Iron Plates, New and Old Rails.

S. T. WELLMAN, President.

J. H. ROOP, Treasurer.

C. H. WELLMAN, Superintendent.

S. H. CHAUVENET, Vice-President.

RICHARD PETERS, Jr., Secretary.

WELLMAN IRON AND STEEL CO.

—MANUFACTURERS OF—

Highest Grade Open Hearth Low Phosphorus Steel Fire Box and Boiler Plate. Bessemer Steel Ship and Tank Plate. Open Hearth and Bessemer Blooms and Slabs.

Low Phosphorus Pig Iron.

— PLATES UP TO 126 INCHES IN WIDTH. —

General Office and Works, Thurlow, Delaware County, Pa.

Chicago, Ills., No. 656 "The Rookery."

New York, N. Y., No. 7 Nassau Street.

E. W. CRAMER, Agent.

J. H. BHLCHER, Agent.

EDWARD CORNING & CO.,

MANUFACTURERS' AGENTS AND COMMISSION MERCHANTS.

BEAMS, CHANNELS,
ANGLES, TEES,
PLATES, BARS, RODS.

IRON AND STEEL

HOOPS, BANDS,
SPIKES, FISH-PLATES,
BOLTS, NUTS, RIVETS.

29 BROADWAY,
NEW YORK.

421 CHESTNUT ST.,
PHILADELPHIA.

70 KILBY ST.
BOSTON.

CORRESPONDENCE SOLICITED WITH BUYERS AND WITH MANUFACTURERS.

W. S. PILLING.

T. I. CRANE

PILLING—AND—CRANE.**IRON ORES:** Lake Superior, Foreign, Concentrates, Magnetic and native Self-fluxing.**PIC IRON:** Low Phosphorus, Open-hearth, Bessemer and other grades.**STEEL:** In Blooms, Slabs and Billets, and scrap.**COKE:** For Furnace and Foundry use.

BULLITT BUILDING, 141 S. FOURTH ST. PHILADELPHIA.

ALAN WOOD COMPANY,

MANUFACTURERS OF

Patent Planished, Galvanized, Common, Best Refined, Cleaned and Charcoal Bloom,

PLATE & SHEET IRON.

ALSO LIGHT PLATES AND SHEETS OF STEEL,

No. 519 Arch Street, Philadelphia, Pa.

Orders solicited especially for Corrugated, Gasholder, Pan and Elbow, Water Pipe, Smoke Stack Tank and Boat Iron; Last, Stamping, Ferrule Locomotive Headlight and Jacket Iron.

CUMBERLAND NAIL AND IRON CO.,

MANUFACTURERS OF

"Cumberland" Nails & Wrought Iron Pipe,

43 North Water St., and 44 North Delaware Ave., PHILADELPHIA.

J. J. MOHR,

Bullitt Building, No. 131 South Fourth St., Philadelphia, Pa.

—SOLE AGENT FOR—

Sheridan, Temple, Brooke, Leesport, Mill Creek, Keystone, Mt. Laurel, Logan and Oley FOUNDRY, FORGE, CHARCOAL AND BESSEMER PIG IRON.

Dealer in Scrap, Old Car Wheels, Muck Bars and Connellsville Coke.

High Grade Tested Chains.**JAMES MCKAY & CO.,**

29TH & LIBERTY STREETS,

PITTSBURGH, PA

Manufacturers of Coil, Crane and Stud Chain. We also manufacture High Grade Steel Chain made of Basic Steel and Special Crane Chain made of U. S. Iron.

JAMES G. LINDSAY & CO.,

BULLITT BUILDING, 133 South Fourth St., PHILA.

IRON and STEEL STRUCTURAL MATERIAL

For all purposes. Estimates Furnished for Iron and Steel Structures.



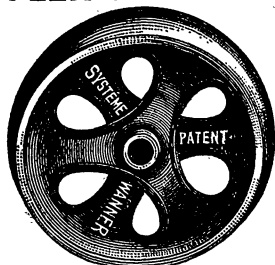
MERRILL BROS., 465 to 471 Kent Ave., Brooklyn, E.D., N. Y

FITZSIMONS & CO.,

—MANUFACTURERS—

**COLD
DRAWN****SHAFTING****IRON
STEEL**

CLEVELAND, OHIO.

FLEXIBLE STEEL WHEELS. WANNER'S SYSTEM

Light weight. Durability. Now exhibited in the Swedish Pavilion at the World's Fair. Smallest possible shaking, thus insuring greater durability to the rolling stock. U. S. Patent, No. 479,722, for sale.

Information to be obtained from: M. W. Rhodin, address Swedish Pavilion, Jackson Park, Chicago, Ill.

M. N. LILIENBERG,

150 Broadway, - - New York City.

EDWARD J. ETTING,
IRON BROKER & COMMISSION MERCHANT

222 S. THIRD ST., PHILADELPHIA, PA.

Pig, Bar and Railroad Iron, Old Rails, Scrap.

AGENT FOR THE

MOUNT SAVAGE FIRE BRICK,

Eastern Penna., West New Jersey and Delaware.

Agent TRENTON IRON CO.,

For the Sale of Wire and Wire Rope.

Longdale (Va.) and other Pig Irons.

STORAGE YARD, Pier No. 57 South (old Navy Yard), which is connected with Penn. R. R. and its various connections. Negotiable Warehouse Receipts issued. CASH ADVANCES MADE ON IRON.

ESTABLISHED 1869.

JEROME KEELEY & CO.,

303 WALNUT STREET, PHILADELPHIA.

Foundry & Forge Pig Irons,**Iron Ores, Coke, Coal,****Steel Blooms, Billets, Rails, etc.****Muck Bars, Blooms, Scrap Iron.**

Consulting Engineers in Metallurgy and Mining.

E. H. Wilson.

A. Kaiser.

J. B. M. Hiron.

E. H. WILSON & CO.,

222 and 224 South Third St., Philadelphia

BROKERS AND DEALERS IN

IRON AND STEEL.

Correspondence solicited.

J. W. HOFFMAN & CO.,

333 and 335 Walnut St., Philadelphia,

Iron and Steel Merchants.**PIG IRON,**

Iron and Steel Plates, Sheets, Bars and Shapes. Rails, Cars and Locomotives. Track Equipment.

CORRESPONDENCE SOLICITED.

JOHN L. HOGAN & CO.,

IRON COMMISSION MERCHANTS.

Bullitt Building, 135 South Fourth St., Phila.

Agents for Brier Hill, Lehigh, Struthers**AND MUIRKIRK PIG IRON,**

Delaware Rolling Mill, muck bars. Youngstown Steel Co., Connellsville Coke.

NORTH BROTHERS MFG. CO.,**Iron and Brass Founders,***Light Castings a Specialty.*

N. W. Cor. 23d and Race Streets, PHILADELPHIA.

Correspondence solicited.

W. H. THOMSON & CO.,

Dealers in

IRON and STEEL and**other METALS**

FOR ALL PURPOSES,

Room 259, Bullitt Building, PHILADELPHIA, PA.

LUCKNOW FORGE.**JOHN W. REILY,**

Fort Hunter P. O., Dauphin Co., Pa.,

MANUFACTURER OF

Blooms and Billets for Boiler Plate, Tubes,

Sheet Iron and Wire, made from

Pig Iron and Scrap.

Prices Quoted—Correspondence Solicited.

B. Houston. J. Max Bernard. H. H. Houston.

C. B. HOUSTON & CO.,

Bullitt Building. PHILADELPHIA.

Pig Iron, Coal, Coke, Steel Rails, Structural Iron, Steel Castings and Fire Brick.

Sole Agents for PAXTON ROLLING MILLS.

STEEL AND IRON PLATES

FRANCIS HOBSON, SEAMAN & CO.,

Successors to FRANCIS HOBSON & SON,
DON STEEL WORKS, SHEFFIELD.

Sole Manufacturers of

HOBSON'S "CHOICE" **(XX)** Extra Best and "Warranted Best"
Cast Steels for Tools, etc.

HOBSON'S "CHOICE" Extra Quality Needle Wire

SEAMAN'S 'NELSON' Brand Extra Cast Steel for Turning Hardest Chilled Rolls, &c.
WAREHOUSE, 97 John St., New York. CHAS. HUGILL, Agent.

THOS. FIRTH & SONS, LIMITED, SHEFFIELD.
CRUCIBLE CAST STEEL.

ABBOTT, WHEELOCK & CO., Agents and Importers of
SWEDISH IRON,

85 OLIVER ST., BOSTON.

23 CLIFF ST., NEW YORK.

S. & C. WARDLOW, SHEFFIELD, ENGLAND.

Manufacturers of the Celebrated Cast and Double Shear Steel.

In Bars, Sheets and Coils, for fine Pen and Pocket Cutlery, Razors, Carvers, Butchers' Knives, Files, Band Saws, Clock, Watch
and all other Springs; also Sole Makers of the Special Brand "TOUGH" Cast Steel for Leather Splitting and
Machine Knives of every description, and for Turning and all other Tools, Dies and Punches.

Office and Warehouse, 95 John St., New York.

Frank S. Pilditch, Agent.

GUSTAF LUNDBERG

Agent for N. M. HOGLUND'S SONS & CO. of Stockholm.
Swedish and Norway Iron.

Bessemer and Open Hearth Steel.

19 KILBY STREET, BOSTON.

CARLISLE WORKS, **KAYSER, ELLISON & CO.,** SHEFFIELD, ENGLAND
Late WILSON HAWKSWORTH, ELLISON & CO.,

(ESTABLISHED 1825.)

CRUCIBLE STEEL AND STEEL WIRE.

WETHERELL BROS., Agents.

81 OLIVER STREET, BOSTON.

93 LIBERTY STREET, NEW YORK.

JONAS & COLVER CONTINENTAL STEEL WORKS, SHEFFIELD, ENGLAND,

MANUFACTURERS OF ALL KINDS OF STEEL.

Tool Steel, Drill Rods, Needle Wire, Hot Rolled Sheet Steel, Cold Rolled Steel for Cor-
set Springs, Band Saws, Clock and Watch Springs and Parts, and all other Purposes.

HERMANN BOKER & CO., 101 & 103 Duane Street,

(Formerly CARL F. BOKER),

Sole Agents and Importers of Steel and Crucible Wire Rods, &c.

JESSOP'S STEEL

MANUFACTURED BY

WM. JESSOP & SONS, L'D.

OF **Best Quality,**
IN **Bars, Sheets & Plates.**

Large assortment of sizes in stock at

91 John St.

NEW YORK,

And other Agencies.

SHEFFIELD,
ENGLAND.

Gold Medal Paris
1889.

WIRE

DRAWING

WORTLES, PLATES and JEWEL DIES.

DIES

NEWTON & SHIPMAN,

83 John St., - New York.

CAMBRIA STEEL,

Steel Rails, STANDARD AND LIGHT WEIGHTS, Street Rails and Railway Fastenings,

BESSEMER AND OPEN-HEARTH BLOOMS, BILLETS AND BARS.

Steel Axles, Steel Angles, Steel Channels, Steel Forgings

CAMBRIA IRON COMPANY, Office, 218 S. Fourth St., Philadelphia.
Chicago Office, Phoenix Building.
(WORKS AT JOHNSTOWN, PA.)

A. & P. ROBERTS & COMPANY,

Pencoyd Iron Works,

MANUFACTURERS OF

Wrought Iron and Open Hearth Steel,

OFFICE: 261 S. 4th Street, PHILADELPHIA, Pa.

Pencoyd Bridge & Construction Co.,

DESIGNERS AND MANUFACTURERS OF

Bridges, Viaducts, Turn Tables, Etc.

WORKS, PENCYD, PA.

EICKEN & CO.'S CRUCIBLE TOOL STEEL

HAGEN WESTPHALIA, GERMANY.

SPECIAL No. 8 works and Fine-Finishes the HARDEST Rolls and Material. BOSS Cold Chisel; HIGH-GRADE ADAPTED Twist-Drill, Tap, Punch, Die, Reamer, Wood and Milling-Cutter-Steel and Blanks.

HIGHEST QUALITY, LOW PRICES, INDUCEMENTS to the TRADE and large USERS.

REPRESENTED BY

EDW'D VORSTER.

IMPORTERS AND EXPORTERS.

MARKT & CO., Agts.,

79-85 North Moore St., New York.

Stock for immediate wants and Trial Orders. Exclusive Local Agencies granted.

A. MILNE & CO.,

Swedish (Norway) Iron and Steel,

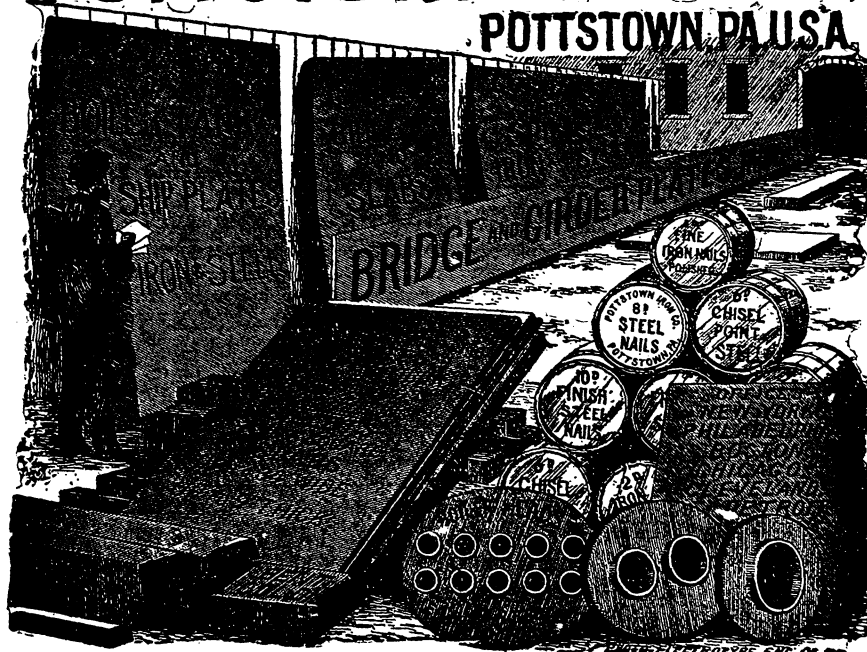
BLOOMS, BILLETS, BARS; WIRE, RIVET AND NAIL RODS.

FOREIGN AND DOMESTIC IRON AND STEEL.

1 Broadway, New York. 8 Oliver Street, Boston.

POTTSTOWN IRON CO.

POTTSTOWN, PA. U.S.A.



FRANKFORD STEEL COMPANY.

FRANKFORD, PHILA., PA.

Steel Railroad and Machine Forgings,

SOLID CRUCIBLE STEEL CASTINGS

AND
Best Grades of Tool and Machinery Steel.

THE IRON-FOUNDER:

A COMPREHENSIVE TREATISE ON

THE ART OF MOLDING,

INCLUDING CHAPTERS ON

CORE-MAKING; LOAM, DRY-SAND, AND GREEN SAND MOLDING; ALSO CRYSTALLIZATION, SHRINKAGE, AND CONTRACTION OF CAST IRON, AND A FULL EXPLANATION OF THE SCIENCE OF PRESSURES IN MOLDS; ADDED TO WHICH ARE FORMULAS FOR MIXTURES OF IRON, TABLES, RULES AND MISCELLANEOUS INFORMATION.

BY

SIMPSON BOLLAND,

Practical Molder and Manager of Foundries.

Illustrated with over Three Hundred Engravings.

12mo, Cloth, \$2.50.

Will be sent free on receipt of the price.

"Among the many recent additions to technical literature, we know of none of more practical value than THE IRON FOUNDER. There are thousands of men in our foundries who will be greatly benefited by its 332 pages of interesting and valuable information."—The Age of Steel.

SENT, POSTPAID, ON RECEIPT OF PRICE, BY

DAVID WILLIAMS,

Publisher and Bookseller,

96-102 Reade St., New York

ÆTNA-STANDARD IRON AND STEEL CO.,

Successors to **Ætna Iron and Steel Co., and The Standard Iron Co.,** Manufacturers of
PLATES and SHEETS, BLACK, GALVANIZED and CORRUGATED Plain Roofing, Siding and Ceiling, also of Sheet Steel, for special purposes, Cold Rolled or Plain and Patent Leveled.
BARS, LIGHT SECTION RAILS, ANGLES, TEES and CHANNELS, odd sections and sizes, Machine Straightened Steel Tire, Ordinary Shafting, Horse-Shoe Bars, Ax-Poll Steel, Toe Calk, Nut, Bolt and Chain Rods, and other special Bars suited to every requirement.
PROMPT SHIPMENT from STOCK.
 Inquiries solicited. Stock List Mailed on Application. Address, **BRIDGEPORT, OHIO.**

CARBON STEEL COMPANY,

PITTSBURGH, PA.,
 —MANUFACTURERS OF—



Universal Mill Plates. Sheared Plates and Sheets. Boiler, Ship and Armor Plates. Also Nickel Steel Plates. List of Sizes Sent upon Application.

AGENCIES:

L. S. BOOMER, 647 The Rookery, (Chicago, Ill.) **THE CONDIT-FULLER CO., Perry-Payne Building, Cleveland, O.**
GEO KINSEY & CO., 249 West Fourth Street, Cincinnati, O. **JAS. G. LINDSAY & CO., Bullitt Building, Philadelphia, Pa.**
BULLARD & POST, 125 Milk St., Boston, Mass.

THE S. Obermayer Co.,

FOUNDRI FACINGS, PLUMBAGO and
Manufacturers of FOUNDRY SUPPLIES, Importers of INDIA SILVER LEAD
FOUNDRI EQUIPMENTS. FOR ALL PURPOSES.
Selling Agents for BLAKENEY CUPOLA. Send for Catalogue.

CINCINNATI, OHIO, = CHICAGO, ILL.

Foundry
Facings

Foundry
Supplies

MANUFACTURERS,
J. W. PAXSON & CO.
Philadelphia, Pa.

GROUND SILICA ROCK,
FIRE BRICK,
FOUNDRI LADLES,
TUMBLING BARRELS.
CORE-COMPOUND.

—AMERICAN—

PIC IRON Storage Warrant Co.

(Bank of America Building.)

44 Wall Street, - NEW YORK.

Correspondence of Furnaces Invited.

PIERSON & CO.,

—DEALERS IN—

IRON and STEEL

OF EVERY DESCRIPTION,

29 Broadway, cor. Morris St., NEW YORK.

FRANCIS WISTER,

COMMISSION MERCHANT,

COKE, COAL, ORES.

National Foundry Coke a Specialty.
 Sulphur less than 0.5.

All sizes National Crushed Coke.

Bullitt Building, PHILADELPHIA

Tips to Inventors. By ROBERT GRIMSHAW, Ph.D., M.E. Telling what inventions are needed and how to perfect and develop new ideas in any line.
 Cloth.....\$1.00

For Sale by David Williams, 96-102 Reade St., N.Y.

CRESCENT STEEL CO.
480 PEARL ST. PITTSBURGH, PA. 64 & 66 S. CLINTON ST. CHICAGO.

GEORGE MESTA, Prest.

W. D. ROWAN, Sec.

J. O. HORNING, Treas.

LEECHBURG FOUNDRY & MACHINE CO.,

Office: **LEWIS BLOCK, Pittsburgh, Pa.**

Sheet and Bar Mills, Shears, Squeezers and Roll-Lathes

ROLLS. MESTA'S PATENT PICKLING MACHINES AND TIN PLATE MACHINERY.

ESTIMATES GIVEN ON COMPLETE TIN PLATE PLANTS.

THE POLDI STEEL WORKS,

Make a specialty of steel used for planing and turning chilled castings, locomotive tires and hard surfaces where other steels will not hold their edge. Also self-hardening steel of equal hardness.

THE FRASSE CO., - 19 Warren St., New York City.

THE BETHLEHEM IRON COMPANY.

SOUTH BETHLEHEM, PENNA.

STEEL RAILS, BILLETS AND MUCK BAR, STEEL FORGINGS.

HOLLOW SHAFTING, CRANKS, ROLLS, GUNS AND ARMOR.

Rough, Machined or Finished, Fluid Compressed, Hydraulic Forged.

NEW YORK OFFICE, - - - 80 BROADWAY.
PHILADELPHIA OFFICE, - - - 421 CHESTNUT ST.

PASSAIC ROLLING MILL CO., Paterson, N. J.

ROLLED STEEL or IRON BEAMS

Channels, Angles, Tees, Bars, Riveted Work, Forgings, Eye Bars, &c., &c.,

Also OPEN HEARTH STEEL BILLETS and SLABS.

NEW YORK OFFICE, - Rooms 151 and 152, No. 45 Broadway.

JUSTICE COX, Jr., IRON AND STEEL

No. 218 SOUTH 4th ST., PHILA'D, PA.

Agent for Haldeman, Grubb & Co.'s Chickies Bessemer Pig Iron,
Mahoning Rolling Mill Co.'s Best Quality Skelp Iron and Steel,
Pulaski Iron Co.'s High Grade Foundry and Forge Pig Iron.

Bars, Angles, Sheets, Tank and Bridge Plates, Muck Bars, Blooms, Scrap Iron and Tool Steel.

THE MONTGOMERY IRON & STEEL COMPANY,

DANVILLE, PA.



PIG IRON, T AND STREET RAILS,

Light Rails, 12 to 40 lbs. per yard.

RAIL JOINTS, SPIKES AND BAR IRON.

NAYLOR & CO.,

New York: 45 Wall Street.

PITTSBURGH, PA.: Lewis Block. PHILADELPHIA, PA.: Bullitt Bldg.

IRON ORE, PIG IRON, SPIEGEL AND FERRO,

IRON AND STEEL WIRE RODS, STEEL BLOOMS, BILLETS AND
SLABS, METALS AND OLD MATERIALS.

- R. M. MUSHET'S - "SPECIAL," STEEL "TITANIC,"

FOR LATHE AND PLANER TOOLS.

(The "Trade-Marks" of which are registered in the United States.)

MANUFACTURED ONLY BY

SAMUEL OSBORN & CO., - - - Clyde Steel & Iron Works, Sheffield, Eng.

SOLE REPRESENTATIVES IN THE UNITED STATES.

B. M. JONES & CO., Nos. 11 and 13 Oliver St., Boston.

No. 143 LIBERTY STREET, NEW YORK.

BOOKS.

YOU CAN OBTAIN PROMPTLY the latest work on any subject in which you are interested by addressing DAVID WILLIAMS, Publisher and bookseller, 96-102 Reade St. New York

"CATASAUQUA"

HIGH GRADE

Bars.

CATASAUQUA MFG. CO.

Charles K. Barns & Co., Agents,
224 South Fourth St., PHILADELPHIA.

L. & R. WISTER & CO., IRON COMMISSION MERCHANTS,

257 So. 4th St., Philadelphia.

Agents for the following Foundry and Forge Pig Irons: Dunbar, Kemble, Tuscarawas (Black Band), Wyebrooke C. & Co. Charcoal Pig Iron, Warner & Co.'s (Middlesboro, England), Carbonizing and Malleable Irons.
Dealers in all kinds of Scrap Iron and Steel.

HENRY LEVIS & CO., Manufacturers' Agents

For Iron and Steel Rails, Car Wheels, Boiler and Sheet Iron and General Railway Equipments.

Old Rails, Axles and Wheels bought and sold.
284 S. 4th St., Philadelphia.

Established 1847.

A. WHITNEY & SONS, CAR WHEEL WORKS, PHILADELPHIA.

Special Wheels for Furnace and Mine Cars.

Manhattan Rolling Mill.

JOHN LEONARD,
446 to 452 West St., New York.

MANUFACTURER OF

HORSE SHOE AND BAR IRON
BLACKSMITH SUPPLIES.
Brooklyn Branch, 589 Kent Ave.

OGDEN & WALLACE,

85, 87, 89 & 91 Elm St., New York.

IRON AND STEEL

Of every description kept in stock.

Agents for Park, Brother & Co.'s
BLACK DIAMOND STEEL.

All sizes of Cast and Machinery Steel constantly on hand.

WILLIAM H. WALLACE & CO., IRON AND STEEL,

10, 12 and 14 ALBANY ST.,
and 131 WASHINGTON ST.,
NEW YORK.

Wm. H. Wallace. Wm. Bispham. E. C. Wallace.

THE MAHONING VALLEY IRON CO.

—MANUFACTURERS OF—

Bar, Band, Sheet, Plate and Tank Iron,
Angle Iron, Nails, Boat Spikes and Rivets

YOUNGSTOWN OHIO.

ESTABLISHED IN 1848. **SINGER, NIMICK & CO., Ltd.** PITTSBURGH, PA.

—MANUFACTURERS OF ALL KINDS OF—

Hammered and Rolled **STEEL.** Warranted Equal to any Produced.



HIGH GRADE SPECIAL Crucible Tool Cast Steel, for all purposes requiring the **very finest** quality.

SINGER'S ANNEALED EXTRA Crucible Tool Cast Steel, for Dies, Cutters, Surgical Instruments, Forceps, and all other purposes requiring an **extra fine** quality.

BEST Crucible Tool Cast Steel, for all purposes requiring steel of **Standard** quality, such as Turning Tools, Taps, Dies, Drills, Punches, Shear Knives, Cold Chisels, or Edge and Machinists' Tools generally, and for Mining and Quarrying purposes.

SAW STEEL, for Circular, Mulay, Mill, Gang, Drag, Pit and Cross-Cut Saws.

HOT ROLLED SHEET STEEL, for Springs, Billet Web and Hand Saws, Nicker Saws, Pocket Knives, Blades and Backs, Drawing and Stamping Cold, &c., &c.

BRIGHT COLD ROLLED SHEET and STRIP STEEL, for Cold Drawing, Stamping and Bending; for Bells, Cups, Ferrules, Springs, Keys, Chains, Sewing Machine and Type-Writer parts, and to take the place of Sheet Brass, all of unequalled finish and accuracy of gauge.

ROUND MACHINERY STEEL, for Shafting, Rollers, Spindles, &c., &c.

AGRICULTURAL STEEL.

"Iron Centre" Cast Plow Steel.

"Soft Steel Centre" Cast Plow Steel.

"Soft Steel Back" Cast Plow Steel.

"Extra Thick Face Centre" Cast Plow Steel.

"Special" (Solid Soft Center) Plow Steel.

Crucible Cast Plow Steel.

Steel Rotary Harrow Discs.

Finished Rolling Plow Colters.

Agricultural Steel Cut to Pattern.

Also Wagon and Carriage Springs, Axles and Steel Tire.

Represented at **243 Pearl and 18 Cliff Streets, NEW YORK**, by

HOGAN & SON, General Agents for Eastern and New England States.

GEORGE M. HOGAN, 417 Commerce St., Philadelphia; FITZ, DANA & CO., 110 North St., Boston, and

W. E. STOCKTON, 16 & 18 West Lake St., Chicago.

HUGH RUSSEL, TEMPLE BUILDING, 185 ST. JAMES ST., MONTREAL, CANADA.

LA BELLE STEEL CO.,

Ridge Avenue and Belmont Street, Allegheny City, Pa. Post Office Address, Pittsburgh, Pa

MANUFACTURERS OF ALL KINDS OF STEEL SPRINGS, AXLES, RAKE TEETH, Etc.

WETHERELL BROS., EASTERN REPRESENTATIVES, 31 Oliver St., Boston, and 93 Liberty St. N.Y.

RICE, LEWIS & SON, Toronto, Ont.

J. TATNALL LEA & CO.,

No. 125 So. Fourth St., Philadelphia.

**BESSEMER, MILL AND FOUNDRY PIC IRON,
MUCK BARS AND IRON ORES.**

W. Dewees Wood Co.,



MANUFACTURERS OF PATENT

PLANISHED SHEET IRON.

PATENTS:

Feb. 6th, 1877.	Feb. 12th, 1884.	Jan. 6th, 1885.
Dec. 10th, 1878.	Mar. 4th, 1884.	Aug. 31st, 1886.
Jan. 10th, 1882.	April 16th, 1884.	Jan. 1st, 1889.
Jan. 1st, 1884.	June 10th, 1884.	Jan. 17th, 1893.

Guaranteed fully equal, in all respects, to the Imported Russia Iron.

—ALSO—

Wood's Smooth Finished Sheet Irons and Sheet Steel, Cleaned and Free from Dust.

GENERAL OFFICES AND WORKS

McKEESPORT, PA.

Branch Office: 111 Water Street, Pittsburgh, Pa.

J. WESLEY PULLMAN

No. 238 S. Third St., Philadelphia.

BEST IRON ORES

New Jersey. New York. Lake Superior
WARWICK PIG IRON.

— SOHO IRON & STEEL WORKS —

MOORHEAD & McCLEANE CO.
MANUFACTURERS OF

PLATE IRON & STEEL.
GALVANIZED SHEET IRON

SOHO CHB TRADE MARK

PLATES, SPECIAL WIDE SHEETS AND EXTRA LONG SKELP IRONS

CORRUGATED & ROOFING IRONS
CURVED CORRUGATED CEILING IRONS

OFFICES AND WORKS.
PITTSBURGH.

EASTERN WAREHOUSE. No. 81 JOHN STREET, NEW YORK.
WESTERN WAREHOUSE. Nos. 16 & 18 W. LAKE ST. CHICAGO.

Stay-Bolt,
Rivet, D. Link,
Axe, Hatchet,
Carriage and
Wagon Axle

IRON.

Superior Quality Refined Bar Iron
"VULCAN" AND "LOCKHART" BRANDS.



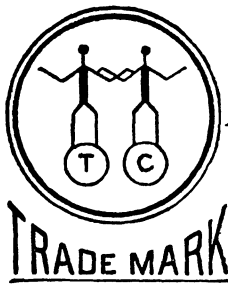
SMALL CHANNELS AND ANGLES,
HEXAGON IRON AND STEEL.

All
Merchant Bar
Sizes
of
Soft
STEEL.

THE MANNESMANN TUBE CO., LTD.,

LANDORE, South Wales, England,

Manufacturers of the



Mannesmann Patent Weldless Steel Tubes.

Rolled Direct from the Solid Bar. The only Tubes with a Spiral Fibre.

SPECIALTIES: Cold Drawn Steel Cycle and Boiler Tubes made of the finest Swedish Charcoal Steel produced. Far superior to any others in the market. **Best Quality Boiler Tubes** (ordinary Finish). Hydraulic, Well Boring and Shell Tubes.

SAMPLES FREE.

FOR PARTICULARS AND PRICES, APPLY DIRECT OR TO OUR AGENT,

D. B. McILWAINE, 111 Chambers St., - - - NEW YORK.

MAHONING FOUNDRY & MACHINE SHOP,

BUILDERS OF

Blast Furnaces, Rolling Mill and Mining Machinery,

ROTARY SQUEEZERS, ORE CRUSHERS, ROLL TRAINS, SHEARS, IRON TRUCKS, &c.

Makers of Castings of all descriptions for cable and electric railroads, building fronts, columns, etc. Address

FRANK JAMESON, Manager, Danville, Pa.

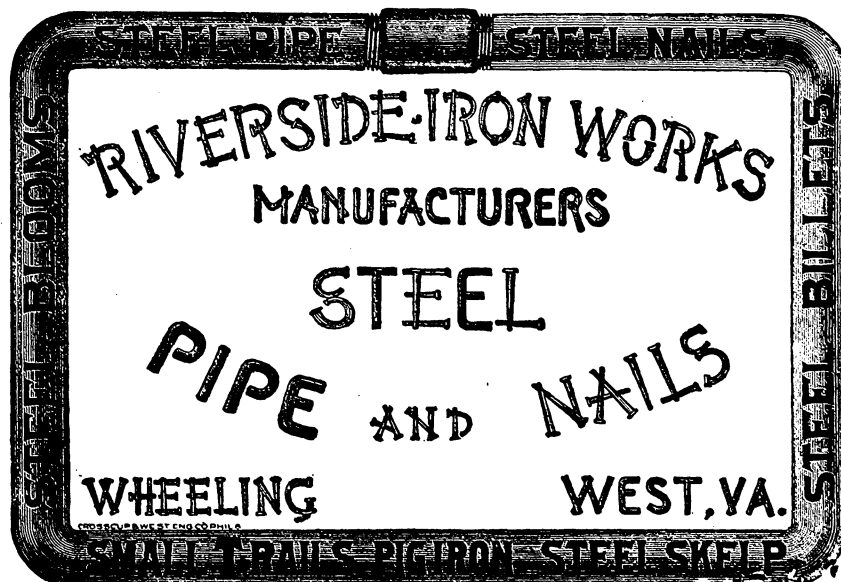
TAYLOR IRON AND STEEL COMPANY. STEEL FOUNDERS

Licenses in the United States for making Hadfield's Manganese Steel.

STEEL CASTINGS OF EVERY DESCRIPTION.

Specialties: Steel Tired and Solid Steel Wheels; Chilled Iron Wheels; Iron and Steel Axles, etc., etc.

General Office and Works, **High Bridge, New Jersey.**



Hundreds of testimonials showing these castings have proved the most satisfactory and economical for all purposes requiring strength and durability.

CHROME STEEL WORKS,
Brooklyn, N. Y.

DROP-FORGINGS

—AND—

DIES TO ORDER.

First Class Work.

THE HERBRAND CO., - FREMONT, O.

A. R. WHITNEY & CO.,

MANUFACTURERS AND DEALERS IN

IRON and STEEL.

AGENCIES:

CARNEGIE STEEL CO., Limited, Structural Material, Steel and Iron Columns, Beams, Channels, Shapes and Plates. Steel Beams Rolled to 24 inches deep.
PORTAGE IRON CO., Limited, Merchant Iron, Bars, Angles, Hoops and Cotton Ties.
BROOKLYN WIRE NAIL CO., Steel Wire Nails. Export Nails a Specialty.
RIVERSIDE IRON WORKS, Steel Pipe.
GLASGOW TUBE WORKS, Boiler Flues.
AMERICAN WIRE NAIL MACHINES. Over 900 working satisfactorily in the United States, 25 in Europe and 100 in Canada.
THE SEIDELL & HASTINGS CO., Charcoal-Iron Boiler Plates.
Plans and estimates furnished and contracts made for Iron and Steel Structures of every description. Please address,
29 Broadway, New York.
P. O. Box 33.

John H. Ricketson, Prest. Wm. Holmes, Treas.
A. G. Barnett, Sec'y.

A. GARRISON FOUNDRY CO.,
Manufacturers of Sand, Patent Homogeneous,
Steel and

Chilled Rolls

Ore and Clay Pulverizers, Rotary Squeezers,
Haskin's Patent Double Spiral Pinions and Rolling
Mill Castings of every description.

Office, Nos. 10 & 12 WOOD ST., PITTSBURGH, PA.

BIRMINGHAM IRON FOUNDRY,
BIRMINGHAM, CONN.

CHILLED ROLLS AND ROLLING
MILL MACHINERY,
McCoy Patent Mill Pinions,
Shears, Rotary Squeezers.
WIRE DRAWING MACHINERY

Special Rolling Machines for Gun Bar-
rels, Hoes, Pick and Axe Polls, Odd
Shapes and Tapers.

ESTABLISHED 1836.

POWDER

—FOR—

Blasting, Mining and Sporting.
ORANGE BRAND.
ELECTRIC BLASTING APPARATUS
SAFETY FUSE, &c.

Send postal card for Illustrated Pamphlet,
showing sizes grains Powder, and describing
Blasting Apparatus. Mailed **FREE**.

LAFLIN & RAND POWDER CO.,
New York Office, 29 Murray St.

DYNAMITE,

RED STAR BRAND

For Mining, Quarrying and Stump Blasting

Safety Fuse, Caps, Platinum Fuse, Leading
and Connecting Wire, with every other requis-
ite for Blasting Purposes. The especial atten-
tion of the hardware trade is invited to our
line of goods.

NEW YORK POWDER CO.
62 Liberty St., New York.



S. CHENEY & SON,
GRAY IRON CASTINGS.
CHEAP HEATING STOVES.
DIAMOND THIMBLES
MANLIUS, N. Y.

CHESS BROTHERS,
MANUFACTURERS OF A FULL LINE OF
SMALL CUT NAILS, TACKS, SHOE NAILS, ETC.

Always in stock. Special goods made to order.

SOFT STEEL PLATES.

Suitable for Implement manufacture and for all Blanking or Stamping uses,
of good surface, rolled carefully to gauges, ranging from No. 6 to 16, inclusive; in
widths up to 15½ inches and to multiples of lengths desired. Finished black or
scaled. And

EXPANDED METAL

In all its varieties of Fire-Proof Lath Fencing, Tree Guards, &c. Send for catalogues
and prices.

Office, 531 Wood St., PITTSBURGH, PA.

DROP FORGING
J. C. SPEIRS & CO. WORCESTER, MASS.



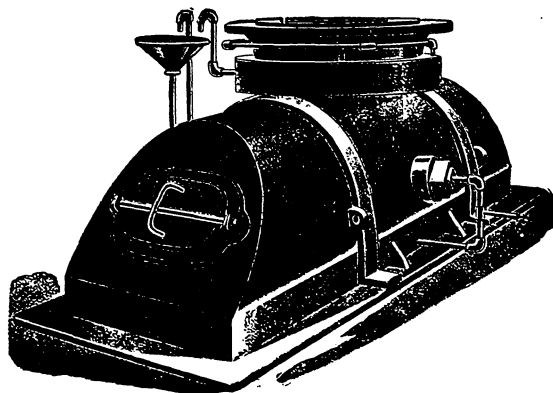
HIGGS WATER VALVE

FOR GAS FURNACES AND
PRODUCERS.

Used for reversing the gas from one
end of the furnace to the other. It is
kept cool by water in an upper and
lower chamber, and the butterfly or
flapper, which prevents it from burn-
ing, warping or leaking and by its use
saves from 20 to 25 per cent of fuel.
saves wasting of iron in the furnace by
the shortage of gas caused by the leak-
ing of the valve. Will last for years

The TOTTEN & HOGG IRON AND
STEEL FOUNDRY CO.,

Office and Works 24th St. and
A. V. R. R., PITTSBURGH, PA.



THE CAMBRIDGE IRON & STEEL CO.
MANUFACTURERS OF

GALVANIZED  **SHEET IRON**

BLACK SHEETS
FOR ROOFING & CORRUGATING

PICKLED
& COLD ROLLED FOR STAMPING

CORRESPONDENCE
SOLICITED

CAPACITY RANGES FROM NO 30
26 INCHES WIDE TO 1'4" x 40" x 120
OFFICE & WORKS CAMBRIDGE, OHIO.

—ESTABLISHED 1850.—
ARCADE MALLEABLE IRON CO.
WARREN McFARLAND & CO.
Malleable Iron and Steel Castings,
WORCESTER, MASS.

Correspondence solicited. Prices given up on receipt of patterns
or samples.

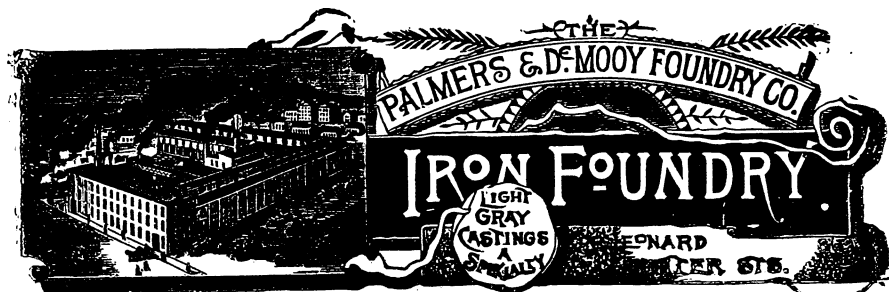
GEO. B. BUCKINGHAM.

IRON CASTINGS TO ORDER.

Small and Large Grey (or common) Iron Castings of uncommonly fine quality. Four large Cupolas run daily. Castings soft, smooth and strong. Prices very low.

We make Castings for all purposes, such as Builders' and Domestic Hardware, Electrical work, Piano and Organ, Wringer, Furniture, Lamp and Chandelier and Agricultural Implement Castings, Grates, Furnace and Machinery Castings, &c., &c. *If you buy any, write us, stating quantities. Send samples if possible.*

SESSIONS FOUNDRY CO., - - - Bristol, Conn.



Soft Castings for Electrical Work and Sewing Machines. Fine Light Gray Iron Castings. CLEVELAND, O.
Metal Patterns designed and made. Also Japanning and Galvanizing.

STEEL CASTINGS

FROM 1 to 40,000 POUNDS WEIGHT,
Of Open Hearth, Chester or Bessemer Steel.
True to Pattern. Sound. Solid.
Gearing of all kinds, Crank Shafts, Knuckles for Car Couplers.
Cross-Heads, Rockers, Piston-Heads, etc., for Locomotives.
Steel Castings of Every Description.
Chester Steel Castings Co.
Works, Chester, Pa. Office, 407 Library St., Philadelphia, Pa.

THE ROBINSON-REA MFG. CO.,

PITTSBURGH, PA.

**SAND AND CHILLED ROLLS.
TIN PLATE PLANTS COMPLETE.**

(No. 5.)

Not a Sample

test, but actual daily practice shows that these facings are superior to any.

SAMPLES FREE

THE J. D. SMITH FOUNDRY SUPPLY CO.,
CINCINNATI, O.



DROP FORGING.

ESTIMATES GIVEN ON APPLICATION.

Sole Manufacturers of Ahlstrom's Patent Parallel Double

EXPANSION BOLTS,

also Single Expansion Bolts. Catalogues mailed on Application.

W. C. BOONE MFG. CO. - Office and Factory, - BOONTON, N. J.

THE GARTLAND FOUNDRY CO.,

MANUFACTURERS OF

Light Work our Specialty. **Soft Grey Iron Castings.** We are prepared to do Japanning and Galvanizing.

UNION and ECHO STS.,
Cleveland, Canton & Southern R. R.,

CLEVELAND, O.

Cranes AND Derricks.

W. S. HALSEY & CO., - Birdsboro, Pa

MCLEOD & HENRY Co
FIRE BRICK
TROY, N.Y.

ESTABLISHED 1856.

HENRY MAURER & SON,

MANUFACTURERS OF

FIRE BRICK

of all Shapes and Sizes,

420 E. 23d St. New York.

**B. KREISCHER & SONS,
FIRE BRICK**

BEST AND CHEAPEST,

ESTABLISHED 1845,

Office, foot of Houston Street, East River, NEW YORK.

ESTABLISHED 1864.

JAMES GARDNER & SON;

MANUFACTURERS OF

**'STANDARD SAVAGE' FIRE BRICK
TILE and FURNACE BLOCKS**

OF ALL SHAPES AND SIZES.

WORKS, Ellerslie, Allegheny Co., Md.

OFFICE, Cumberland, Md.; P. O. Box 540.

J. M. Hamilton & Co., Agents, - Baltimore, Md.
Stowe, Fuller & Co., Agents, - Cleveland, O.

Established 1848.

OSTRANDER FIRE BRICK CO.,

Manufacturers of

FIRE BRICK

**FOR ALL PURPOSES
TROY, N. Y.**

**UNION MINING COMPANY
MOUNT SAVAGE FIRE BRICK.**

Agent for Eastern Penna., West New Jersey and Delaware
EDWARD J. ETTING,
222 South Third St., Philadelphia, Pa.

Patent Tumbling Barrels.

MANY VARIETIES

For all Kinds of Work.

Send for new Catalogue.

HENDERSON BROS., WATERBURY, CONN

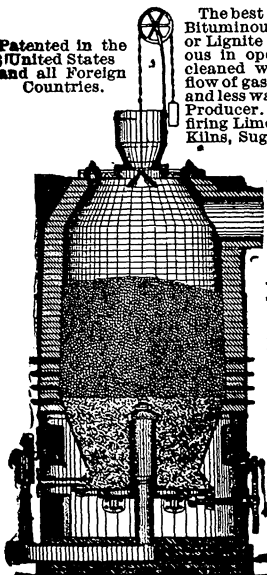


R. D. Wood & Co. 400 Chestnut St.
PHILADELPHIA.

SOLE MAKERS OF THE

**TAYLOR REVOLVING-BOTTOM
GAS PRODUCER.**

Patented in the United States and all Foreign Countries.



The best Producer for either Bituminous or Anthracite coal or Lignite; absolutely continuous in operation, as the fire is cleaned without stopping the flow of gas. Less labor required and less waste than in any other Producer. Producer Gas for firing Lime, Brick and Pottery Kilns, Sugar-house Char Kilns, Boilers, etc.
Also applicable to all Regenerative Furnaces.
Send for Pamphlet.

**CAST IRON
PIPE**

MATHEWS' FIRE HYDRANTS
EDDY VALVES,
VALVE
INDICATOR POSTS.

Heavy Loam Castings
Special Machinery.
Water Power Pumps
and
TURBINES.

**HYDRAULIC JIB and TRAVELING CRANES,
FREIGHT and CAR LIFTS, Etc.
GAS HOLDERS and GAS MACHINERY.**

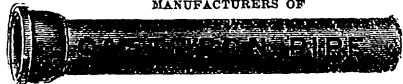
**A Trial will
Convince You**

THAT WE MAKE
**SOFT AND SMOOTH
Light Gray Iron Castings,**

- - SOUND - -
Brass and Bronze Castings

TRUE TO THE PATTERN.
Also HAVE FACILITIES FOR FINISHING.
Sample for estimate solicited.
I. S. SPENCER'S SONS, Guilford, Conn.

DONALDSON IRON COMPANY,
MANUFACTURERS OF



CAST IRON PIPE
And Special Castings for Water and Gas. Also Flange Pipe
Emaus, Lehigh Co., Pa.

FINE GRAY IRON

FRANKLIN IRON FOUNDRY,
The Burr and Houston Company
23-39 Franklin Street, Brooklyn (Greenpoint), N. Y.

Special Attention Given to Fine Castings
Telephone Call Greenpoint 174.

Triple and Quadruple Expansion Engines
and Boilers and their Management. By
A. RITCHIE LEASK. 59 illustrations, 12mo, cloth.
\$2.00
For Sale by David Williams 96-192 Reade St., N. Y.

THE GALLOWAY BOILER.

Safety, Maximum Economy in Fuel, Lowest Cost of Maintenance.
Greatest Durability, Large Steam and Water Spaces.

Are the Advantages Offered by this Boiler.

SPECIFICATIONS AND PRICES UPON APPLICATION TO

EDGE MOOR IRON COMPANY,

Post Office, Wilmington, Delaware.

WILLIAM SELLERS, Pres't.

JOHN SELLERS, Jr., Vice-Pres't.

H. B. BRADFORD, Supt.

WM. F. SELLERS, Secretary.

WILLIAM H. CONNELL, Treasurer.

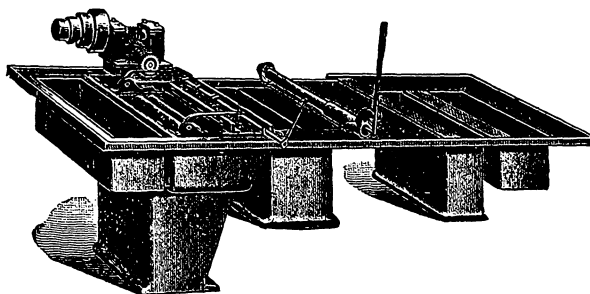
F. W. HEISLER, Purchasing Agent.



THE LLOYD BOOTH CO.,

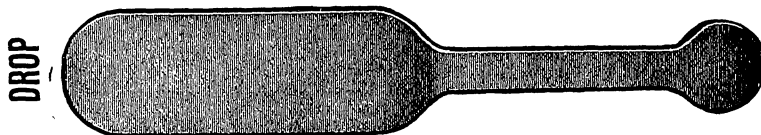
YOUNGSTOWN,
OHIO.

Tinning
MACHINERY.



Rolling Mills,
Sand and Chilli
ROLLS.

WYMAN & GORDON, Worcester, Mass.



DROP

FORGINGS.

GRAY IRON, BRASS, ALUMINUM and ALUMINUM BRONZE CASTINGS
of the very best quality.

Very much time saved by using clean and soft castings. We use only the best material. A trial will convince you. PICKETS and ROSETTES for Wire Workers. Catalogue of same. NICKEL PLATING and JAPANNING, also METAL PATTERN MAKING. We invite correspondence.

HAIGHT & CLARK, - - ALBANY, N. Y.

DROP FORGINGS

Of Every Description, in Iron, Steel, Copper
and Aluminum.

Hoist Hooks, Shafting Collars, Eye Bolts, Wrenches, Machine
Handles, Fence Ornaments.

SPECIAL ATTENTION GIVEN TO THE MANUFACTURE OF
SPECIAL FORGINGS.

PHILADELPHIA DROP FORGE COMPANY,

Office and Works, S. E. Cor. American and York Sts., Philadelphia.



Cranes

Do not imagine that we make only one kind. Our name may mislead. We design and manufacture them for Forges, Mills, Railways, Machine Shops. Wherever there is a load to be lifted we can make a crane to lift it: and wherever ours are, they are practical and serviceable. We will send you circulars, designs and prices.

Detroit Foundry Equipment Co.,
CRANES, CUPOLAS, LADLES, TUMBLERS.

Whiting's Improved Car Wheel Foundry Plant.

DETROIT. NEW YORK OFFICE. CHICAGO OFFICE.
Mich. Ave. and D. & B. C. Ry. 182 Front St. 225 Dearborn St.

Works :

NEW CASTLE, PA.

Offices :

TIMES BUILDING, PITTSBURGH, PA.

THE JAMES P. WITHEROW CO., Engineers and Contractors

FOR THE COMPLETE CONSTRUCTION OF

Blast Furnaces, Hot Blast Stoves,
Bessemer and Open Hearth Steel Plants,
Blowing and Reversing Engines,
Blooming Mills, Boilers, Gas Producers,
Heavy Machinery

OF EVERY DESCRIPTION and STRUCTURAL WORK OF ALL KINDS.

JAMES P. WITHEROW, Gen'l Mgr.

We manufacture everything at our New Castle Works for the complete construction and equipment of the above, insuring efficiency and prompt delivery.

Tool Steel TRETHEWEY MFG. CO., - 47th ST., PITTSBURGH, PA.

Dies

Of any size.

MANUFACTURERS OF

Forgings of Machinery or Tool Steel, Rolling Mill Machinery, Steam Hammers, Squaring Shears, Double Headed Rotary Shears, Shear Grinding Machinery, Circle Cutting Machines, Roll Lathes, Hardened Forged Steel Rolls, Roll Turning Tools, Solid Steel Shear Knives.

McCLURE, AMSLER & CO.,
Engineers and Contractors,
Bissel Block, Pittsburgh, Pa.

BLAST FURNACE CONSTRUCTION
A SPECIALTY.

General Agents for Massick's and Crooke's Patent Fire Brick Stoves; Designs and Estimates for the construction of Blast Furnace Work, and for all kinds of Hot Blast Fire Brick or Pipe Stoves; and all other kinds of Brick Work pertaining to Steel Plants, Iron, Brick or Wooden Buildings, all kinds of Iron Construction in general.

We propose to put into successful operation all the plants we design and contract for.

Light
AND
Medium Weight
GRAY IRON CASTINGS.

WE SOLICIT CORRESPONDENCE
WITH THOSE WHO USE THE ABOVE.

★ We claim to have
few equals and no
superiors in quality.

We have unusual capacity.
Two seven-foot cupolas.

**The Taylor &
Boggis Fdy. Co.**

521 Seneca St., Cleveland, O.

A Practical Workshop Companion for Tin, Sheet-Iron and Copper-Plate Workers. By LEROY J. BLINE, new revised, enlarged edition, with over 170 newly engraved illustrations: 296 pages; 12mo. cloth.....\$2.50

This deservedly popular book has been thoroughly revised and contains over 100 additional pages, with 170 newly engraved illustrations. The volume contains rules for describing various kinds of Patterns used by Tin, Sheet-Iron and Copper-Plate Workers; Practical Geometry; Mensuration of Surfaces and Solids; Tables of the Weights and Strengths of Metals and other Materials; Tables of Areas and Circumferences of Circles; Composition of Metallic Alloys and Solders, with numerous valuable Receipts and Manipulations for every-day use in the workshop. Sent, post-paid, on receipt of price by DAVID WILLIAMS, Publisher, 96-102 Reade St., New York.

THE S. R. SMYTHE COMPANY, INCORPORATED.

LEWIS BLOCK, ENGINEERS AND CONTRACTORS. PITTSBURGH, PA.
**Regenerative Gas Furnaces and Gas Producers
For All Purposes.**

TUBE, STEEL, ROLLING MILLS, GLASS WORKS CONSTRUCTION, Etc.

We contract for complete Plants, guarantee results and satisfactory operation of same.

OVER 100 PLANTS IN SUCCESSFUL OPERATION.

JULIAN KENNEDY.
Consulting and Contracting Engineer,

Rooms 36, 37, 38, 39 Vandergrift Building, Pittsburgh, Pa.

Blast Furnaces, Bessemer and Open Hearth Steel Works, Rolling Mills.

STEAM AND HYDRAULIC MACHINERY, &c.

—Branch Office of The Latrobe Steel Works.—

Wm. Swindell & Bros.,
ENGINEERS AND CONTRACTORS,

Regenerative and Recuperative Gas Furnaces for
Steel, Iron and Glass.

SWINDELL'S IMPROVED GAS PRODUCERS,

243 BUILT SINCE APRIL 1, 1891.

P. O. Box 945.

548 Smithfield St., Pittsburgh, Pa.

ALEX LAUGHLIN & CO.

LEWIS BLOCK, PITTSBURGH, PA.

GAS HEATING
GAS PUDDLING
CRUCIBLE
OPEN HEARTH
TUBE WELDING

FURNACES

AND ARTIFICIAL GAS PRODUCERS OF EVERY
DESCRIPTION, FOR ROLLING MILLS, STEEL AND TUBE WORKS.
We guarantee to place all plants erected by us in successful operation.

J. A. HERRICK, M. E.,

Consulting Engineer and Contractor:
Room 609, 284 Pearl Street, NEW YORK.

—STEEL CASTING PLANTS A SPECIALTY.—

Melting and Heating Furnaces of ALL KINDS.

Patent Gas WATER VALVES. Improved "BASIC" and "SEMI-STEEL" Processes and FURNACES.
New CONTINUOUS Gas PRODUCERS.

COLD DRAWN STEEL

SEAMLESS TUBING

SHELLEY STEEL TUBE CO.

From $\frac{1}{8}$ to $1\frac{1}{4}$ inches in diameter and from No. 8 gauge to 26. Made from the best quality of steel, guaranteed perfect and to stand the severest tests. Reasonable in price.

Address, for samples and prices,

SHELBY, OHIO.

JAMES HEMPHILL, President.
WM. H. CONLEY, Treasurer.

THOS. B. RITER Vice-President.
JNO. F. WILCOX, Gen'l Manager.

PITTSBURG IRON & STEEL ENGINEERING CO.

LEWIS BLOCK, PITTSBURG, PA., U. S. A.

BESSEMER AND OPEN-HEARTH STEEL PLANTS.

Rolling Mills (Blooming, Rail, Plate, &c). Blast Furnaces, Engines
Boilers, Bridges, Girders, Iron Buildings.

WORKS BUILT COMPLETE and Fully Equipped for Operation.

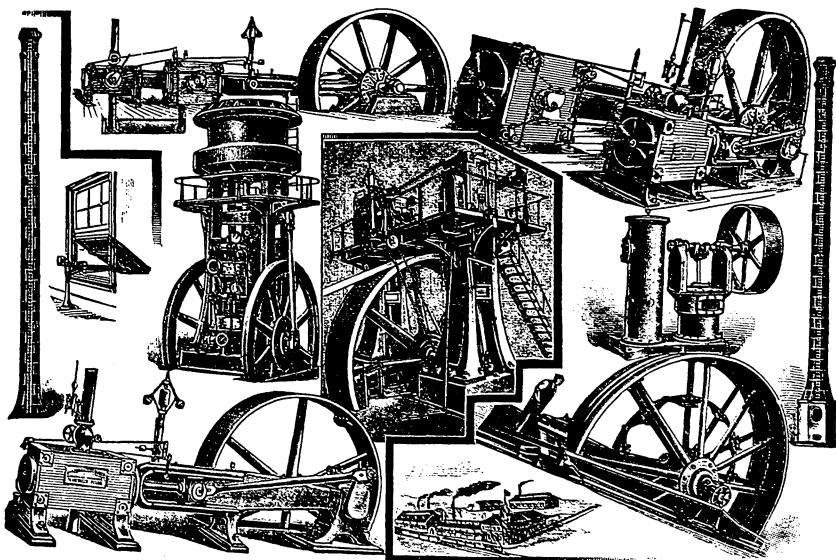
THE D. R. LEAN COMPANY, ENGINEERS and CONTRACTORS,

Penn Building, Pittsburgh, Pa.

Blast Furnace and Steel Plant construction. Regenerative
Gas Furnaces and Gas Producers.
Sole Agents **FORD & MONCUR'S** Fire Brick Stove, Machinery
and Castings, Iron Buildings, &c.

— PHILADELPHIA CORLISS ENGINES. —
AIR PUMPS AND CONDENSERS.

BAND AND FLY WHEELS. STEEL-PLATE CHIMNEYS.
— BLOWING ENGINES. —



BUILT BY

PHILADELPHIA ENGINEERING WORKS, LIMITED,
MIFFLIN STREET, EAST OF FRONT,
PHILADELPHIA, PA.

STANDARD FOUNDRY & MFG. CO., - CLEVELAND, OHIO.

— HEADQUARTERS FOR —

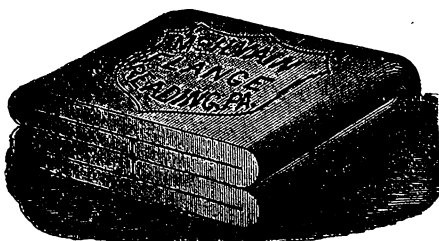
LIGHT GRAY IRON CASTINGS.

— UNEQUALED IN —

SOFTNESS and SUPERIOR FINISH.

Our Castings in finishing will save time and tools. We solicit a trial order knowing that we can please you. Send samples for prices.

TENSILE STRAIN. } 56,000 to 64,000 lbs.



CAPACITY. { Plates 1 inch thick to No. 12.
30 feet long.
70 inches wide.

WM. McILVAIN & SONS,

READING, PA.,

MANUFACTURERS OF

IRON AND STEEL

BOILER PLATES.

Locomotive, Fire Box, Flange, Shell,
Tank Iron and Steel, including Plates for
Bridges, Girders, Stacks, Pipe and Fire
and Burglar-proof Safes.

VICTOR COLLIAU,

Sole builder of his

New and Improved Patented



HOT-BLAST Colliau Cupola,

287 Jefferson Ave.,

DETROIT, MICHIGAN,

U. S. A.

The Iron-Masters' LABORATORY

Exclusively for the

*Analysis of Ores of Iron, Pig and Manu-
factured Iron, Steels, Limestone, Clays,
Slags and Coal for Practical
Metallurgical Purposes.*

Branch Office, 339 Walnut St., Philadelphia.

All Analytical Work at Warrenton, Virginia.
J. BLODGET BRITTON.

This laboratory was established in 1866, at the
instance of a number of practical Iron Masters,
expressly to afford prompt and reliable infor-
mation upon the chemical composition of the
substances above mentioned, for smelting and
refining purposes, the object being to make it
at once a convenient, practically useful, and
comparatively inexpensive adjunct to the Fur-
nace, Forge and Rolling Mill.

M. V. SMITH, PRES.
C. C. MORROW, SEC.

M. A. GREENE, VICE-PRES.
JOHN A. ELLIOTT, TREAS.

Artificial Gas Engineering Co., Consulting and Contracting ENGINEERS.

ARTIFICIAL GAS applied to all Branches
of Manufacturing and Domestic Uses.
Apparatus for the Manufacture of
Coal-Gas Furnished at Lowest Prices.

706 TIMES BUILDING,
PITTSBURGH, PA.

Frank C. Roberts & Co., CIVIL ENGINEERS.

Blast Furnaces, Steel Works, Rolling
Mills, Iron and Steel Bridges and Build-
ings, Factory and Warehouse Construction

OFFICES:

S E. Cor. 4th and Chestnut Sts., Philadelphia, Pa

HENRY AIKEN, Consulting Mechanical Engineer,

Rooms 203-206 Lewis Block,
PITTSBURGH PA.

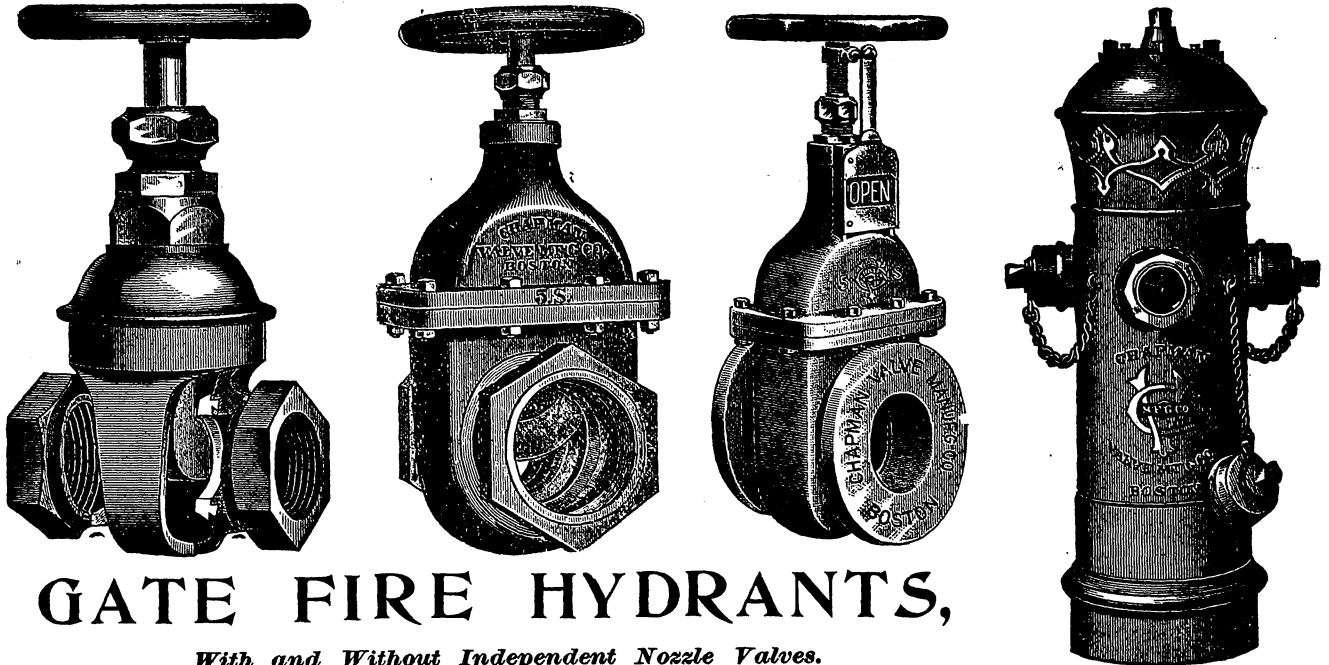
EXHAUST TUMBLERS, Hexagon, Round or Wooden BEST AND CHEAPEST.

WM A. SWEETSER
39 Montello St., Brockton, Mass.

Chapman Valve Manufacturing Company,

MANUFACTURERS OF

Valves and Gates for Steam, Water, Gas, Ammonia.



GATE FIRE HYDRANTS,

With and Without Independent Nozzle Valves.

Valves and Hydrants made with Babbitt Metal Seats and non-corrosive working parts. **All Work Guaranteed.** Send for Price-List

The GENUINE CHAPMAN VALVES in all cases will bear our name in full, either rolled in or cast upon the shell, and also our Trade Mark and Monogram.

We make a Specialty of Valves for Superheated and High-Pressure Steam, 125 lbs. Pressure and Upwards.

WORKS AND GENERAL OFFICE:

INDIAN ORCHARD, MASS.

Chicago Office, 24 West Lake Street.

TREASURER'S OFFICE:

72 Kilby and 112 Milk St., Boston, Mass.

New York Office, 28 Platt Street.

TURNBUCKLES

R. R. SPIKES, BAR IRON and CAR AXLES.

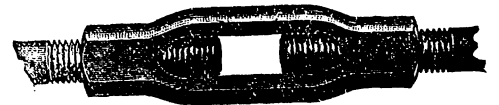
MADE BY

THE CENTRAL IRON & STEEL CO.

BRAZIL, IND.



Wrought Iron Open, made from the best Charcoal Iron. The only Buckle made that has a perfect Wrench Hold. Guaranteed stronger than any similar article on the market.



THE EYNON-EVANS MANUFACTURING CO.,

Patentees and
Manufacturers of

THE EYNON-KORTING COMPOUND INJECTORS.

Extra Heavy Globe and Angle Valves.  Brass Castings up to 5000 lbs.

Blowers, Ventilators, Blast Nozzles, Exhausters, Brass Syphons, Acid Syphons, Condensers.

Fifteenth and Clearfield Sts., Philadelphia, Pa.

RIEHLE

BROS. TESTING MACHINE CO., Phila., have issued a new describing and illustrating all the various styles of their U.S. Standard Testing Machinery with the special appliances. Marble Machinery, Rope Twisters, Loam Mills, Riehle-Robie Frictionless Ball Screw Jacks, Iron and Wooden Trucks, &c., &c., are described. It is desired to have one of these Catalogues in the office of every Superintendent, Purchasing Agent, Engineer or Manufacturer using such Machinery. A copy will be mailed free of charge to those who may apply.

CAT. No. 3

ZUCKER & LEVETT CHEMICAL CO.,
10, 12 & 14 Grand Street, New York, U. S. A.

NICKEL PLATING OUTFITS,

Dynamos and Motors for Light, Power and Electro-plating.

Send for Catalogue of
NICKEL AND ELECTRO-PLATING SUPPLIES AND POLISHING MATERIAL.

C. & C. ELECTRIC MOTORS AND DYNAMOS

Highest Electrical Efficiency.

Best Mechanical Construction.

Electric Pumps, Hoists, Fans, Blowers, Etc.

Large experience in and special attention paid to electrical transmission of power in factories.

THE C. & C. ELECTRIC CO.

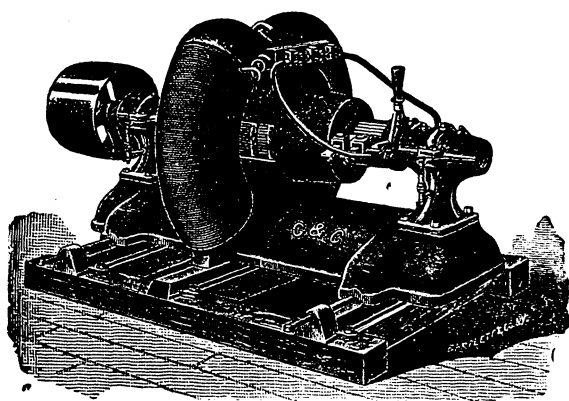
GENERAL OFFICES:

402 and 404 Greenwich St., New York.

BRANCH OFFICES:

CHICAGO, BOSTON, PHILADELPHIA, CLEVELAND,
201 Madison Street. 63 Oliver Street. 633 Arch Street. Cuyahoga Building

AGENCIES IN ALL PRINCIPAL CITIES.



ESTABLISHED 1820.

INCORPORATED 1891

The Hanson & Van Winkle Co.,

MANUFACTURERS OF

**NICKEL AND ELECTRO
PLATERS' MATERIAL.**

Nickel-Plating Outfits

From \$20 upward.

DYNAMO-ELECTRO MACHINES

For all purposes.

The New H. & V. W. Dynamo Machine.

In sizes from No. 1 to No. 5.

FROM \$100 TO \$500.

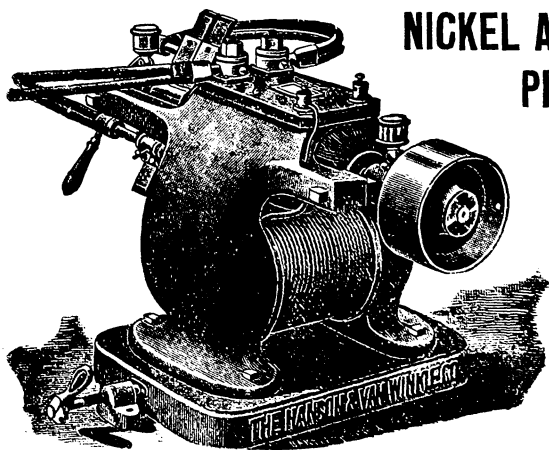
These machines will be placed on 30 days' trial with responsible parties, and if not satisfactory may be returned at our expense. Guaranteed 30% more powerful than any machine in the market at same price.

219-221 Market St., Newark, N. J.

81 Liberty St., New York.

35-37 South Canal St., Chicago, Ill.

WE FURNISH EVERYTHING.



OIL 
AND
WATER

EASILY AND COMPLETELY REMOVED FROM

STEAM

BY OUR

Cochrane Separators
FOR HORIZONTAL OR VERTICAL
PIPES.

FOR PARTICULARS ADDRESS

Harrison Safety Boiler Wks.,

Germantown Junction. PHILADELPHIA, PA.

THE DETROIT DYNAMO CO.

(INCORPORATED),

DETROIT, MICH.,

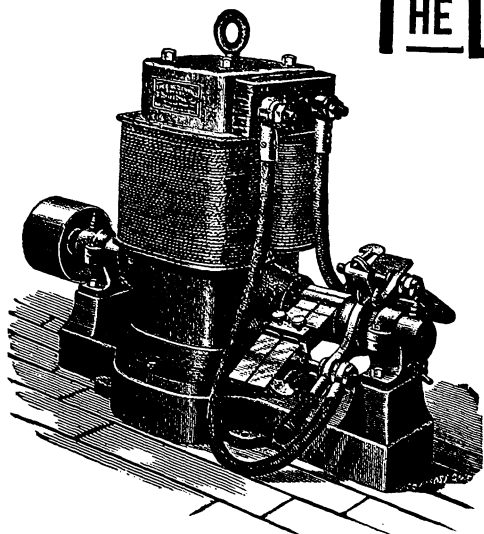
Electroplating,
Electrotyping,
Copper Refining,
Arc and
Incandescent
Lighting.

MFRS. OF

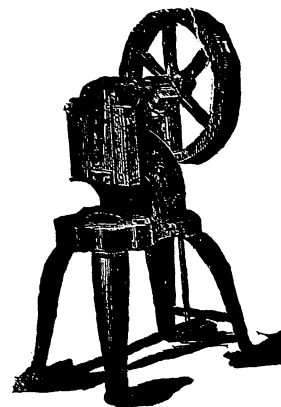
**"King"
Dynamos**

Fan Ventilating
and Power Motors.

DEALERS IN
ELECTROPLATERS' SUPPLIES.



MANUFACTURERS OF
INCANDESCENT
LIGHTING
ELECTRIC POWER
AND
ELECTRO-PLATING
MACHINES.
OLBURN ELECTRIC MFG. CO.
FITCHBURG, MASS.



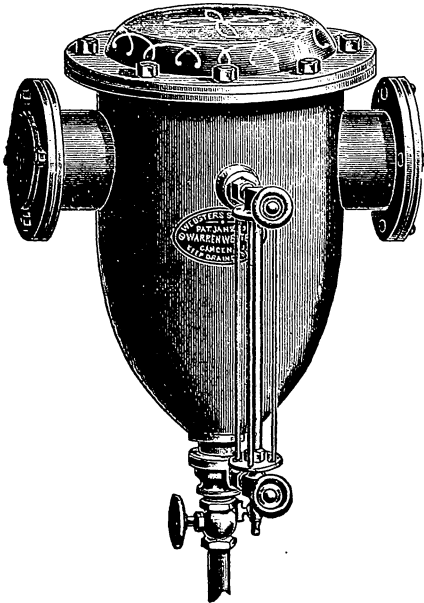
A. H. MERRIMAN,
MERRIDEN, CONN.,
Manufacturer of all Descriptions of

PRESSES.

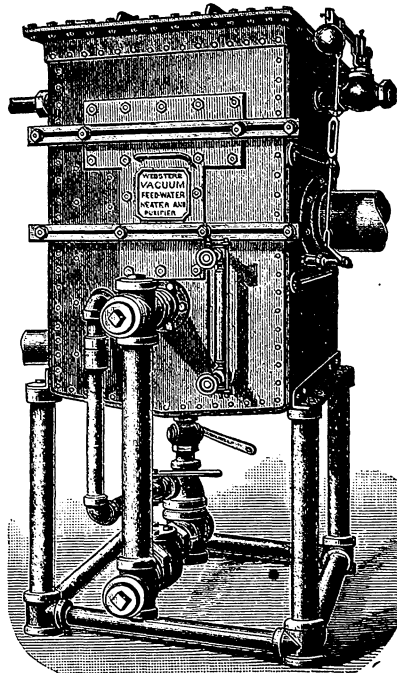
THE 4000 HORSE POWER Webster Vacuum Feed Water Heater and Purifier

Is the largest Feed Water Heater in Practical Operation at the
World's Columbian Exposition, and can be seen in Boiler
Room of Machinery Hall.

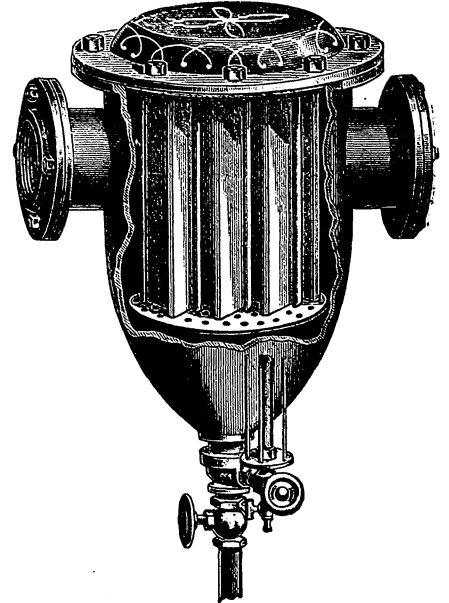
Patented Jan. 24, 1893.
No. 490,461.



THE WEBSTER OIL EXTRACTOR.



THE WEBSTER VACUUM FEED WATER
HEATER AND PURIFIER.



THE WEBSTER STEAM SEPARATOR.

SOLE LICENSEES IN THE U. S. FOR THE "WILLIAMES" VACUUM SYSTEM OF **STEAM HEATING,**

UTILIZING EXHAUST STEAM WITHOUT BACK PRESSURE UPON ENGINES, PUMPS, ETC.

SPECIALISTS

in examining steam plants where increased efficiency and greater economy is desired in heating feed water for steam boilers; also warming buildings by the utilization of exhaust steam without back pressure upon the engine irrespective of present heaters or methods employed.

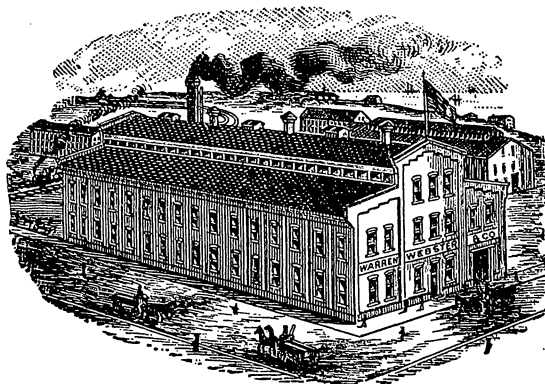
EXAMINATIONS AND ESTIMATES FREE.

SEND FOR CATALOGUES.

FOR SALE.—Feed Water Heaters, slightly used, of other makes, taken by us in part payment, where the Webster Vacuum Heater has recently been adopted. Send for List and Prices.

WARREN WEBSTER & CO.,

Main Office
and Works, CAMDEN, N. J.



BRANCHES:
CHICAGO,
NEW YORK.

AGENCIES:
BOSTON,
PITTSBURGH,
HARRISBURG,
CLEVELAND,
CINCINNATI,
BUFFALO,
SAN FRANCISCO.
Darling Bros., 112 Queen St., Montreal, Can.



THOROUGH INSPECTIONS

And Insurance against loss or damage to property and loss of life and injury to persons caused by

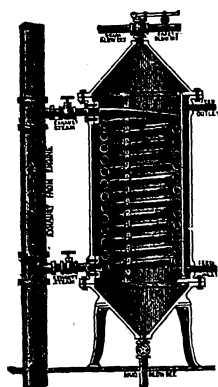
Steam Boiler Explosions

J. M. ALLEN, Pres. WM. B. FRANKLIN, Vice-Pres. F. B. ALLEN, 2d Vice-Pres. J. B. PIERCE, Sec. and Treas

BOARD OF DIRECTORS:

J. M. ALLEN, President.
FRANK W. CHENEY, of Cheney Brothers Silk Manufacturing Co.
CHARLES M. BEACH, of Beach & Co.
DANIEL PHILLIPS, of Adams Express Company.
RICHARD W. H. JARVIS, President Colt's Fire Arms Manufacturing Co.
THOMAS O. ENDERS, of the United States Bank.
LEVERETT BRAINARD, of the Case, Lockwood & Brainard Co.
GEN. WM. B. FRANKLIN, late Vice-President Colt's Pat. Fire Arms Mfg. Co.
NELSON HOLLISTER, of the State Bank, Hartford.

HON. HENRY C. ROBINSON, Attorney at Law, Hartford.
HON. FRANCIS B. COOLEY, of the National Exchange Bank, Hartford, Conn.
A. W. JILLSON, late Vice-Prest. Phoenix Fire Insurance Co., Hartford, Conn.
EDMUND A. STEADMAN, President of the Fidelity Co., Hartford, Conn.
GEORGE BURNHAM, Baldwin Locomotive Works, Philadelphia.
HON. NATHANIEL SHIPMAN, Judge U. S. Circuit Court.
C. C. KIMBALL, Prest. Smythe Manufacturing Co., Hartford, Conn.
PHILIP CORBIN, of P. & F. Corbin, New Britain, Conn.



THE AMERICAN FEED WATER HEATER

Received the First Prize at the

Mechanics' Association Fair, - Boston, Mass.

What you get when you buy the AMERICAN HEATERS:

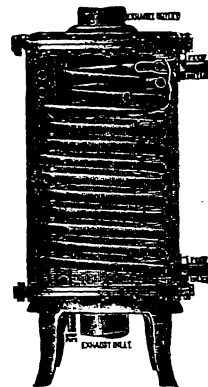
COPPER COILS,
SOLIDLY BRAZED,
GUN METAL FITTINGS
AND CLAMP STAYS,
STEEL SHELLS,

NO RUSTING OUT,
NO LEAKY JOINTS,
NO TROUBLE FROM EXPANSION,
NO BACK PRESSURE,
NO OIL IN BOILER.

We guarantee this Heater to be the Most Durable, Effective and Cheapest.

WHITLOCK COIL PIPE CO.,

27 South Street, - - - - Elmwood, Conn.



BONNELLS NUBIAN	<p>NUBIAN BONNELL'S NUBIAN BONNELL'S NUBIAN BONNELL'S NUBIAN BONNELL'S NUBIAN</p>		BONNELLS NUBIAN
	<p>BONNELLS NUBIAN</p>	<p>MONEY</p>	
	<p>We Have It You want It.</p>	<p>You Have It We Want it.</p>	
	<p>And for your money we will give you the best black on earth. Every gallon guaranteed. Far superior to asphaltum and just as cheap.</p>		
<p>77 Warren St., New York, N. Y. Hall & Carpenter, Philadelphia. Taylor Goodrich, San Francisco.</p>		<p>THE NUBIAN IRON ENAMEL CO., 33-35 Nubian Ave., CRAGIN, ILL.</p>	
<p>NUBIAN BONNELL'S NUBIAN BONNELL'S NUBIAN BONNELL'S NUBIAN BONNELL'S NUBIAN</p>			

WRIGHT'S BUSINESS METHODS,

—OR THE—

Wright Key to Double-Entry Bookkeeping, Wholesale and Retail Business.

How the books are conducted; every book described and exemplified; its usage explained in minute detail; a full set of books in a completed state, containing 1500 business-like entries.

JOINT STOCK ACCOUNTS.

Comprehension of the subject at last reached; capital stock; preferred stock; common stock; watered stock; fictitious accounts not permissible, in fact not necessary; how avoided; "working capital" a misnomer; stock all taken; stock not all taken; nominal capital; actual capital; stock sold above par; stock sold below par; stock given away; dividend and sinking fund.

Importing Business; also Manufacturing.

How the books are conducted in each; their wonderful details explained in a way to reach your comprehension and meet your requirements; information not contained in any other publication.

Expert Accounting and Chartered Accountants; What it Means; Their Methods Explained.

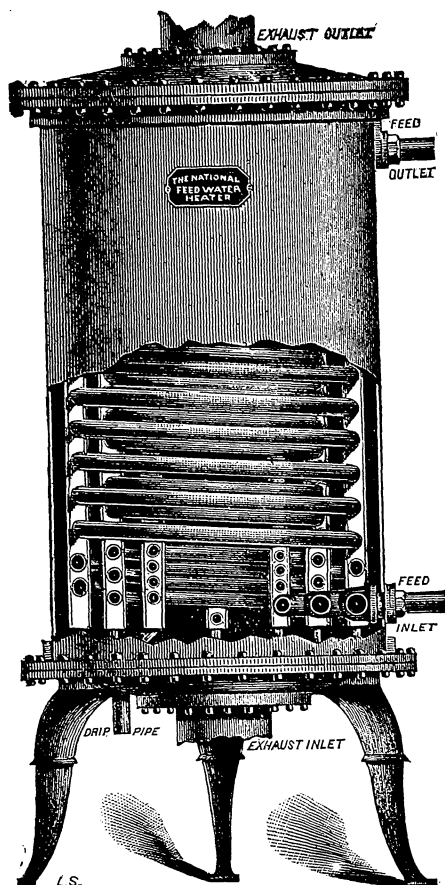
By PRINCE ALBERT WRIGHT, Practical Bookkeeper and Consulting Accountant,
PRICE \$2.50.

Any book published sent, postpaid, on receipt of price by

DAVID WILLIAMS, Publisher and Bookseller, 96-102 Reade St., N. Y.

The National Feed-Water Heater,

Delivering Water to the Boiler at 210° to 212°.



Over 400,000 Horse-Power in Use, and Satisfaction Universal.

18 Sizes Manufactured.

From 8 to 2000 Horse-Power.

Prices Low and Every Heater Guaranteed

Catalogue with list of users furnished on application.

ALSO MAKERS OF

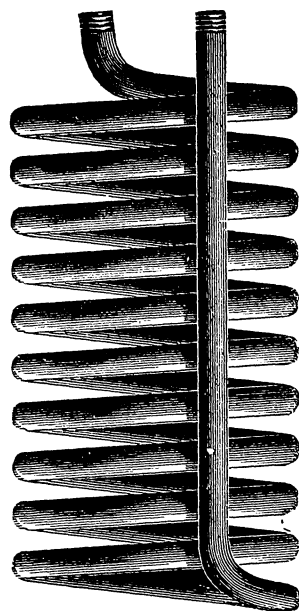
Coils and Bends of Iron,

BRASS AND COPPER PIPE.

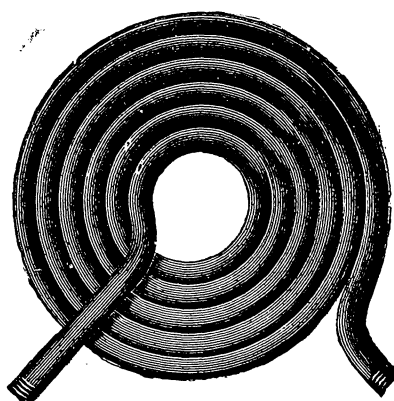
—ALL STYLES.—

THE NATIONAL PIPE BENDING CO.,

98 River St., New Haven, Conn.



SPIRAL COIL.



FLAT COIL—CLOSE.

The Practical Brass and Iron Founder's Guide.

A Treatise on Brass Founding, Molding, the Metals and their Alloys, etc.

By JAMES LARKIN.

Late Conductor of the Brass Foundry Department of the Penn Works, Philadelphia.

A New Revised and Greatly Enlarged Edition.

CONTENTS :

Among the most important and entirely new sections of this edition of this valuable and popular book are the following :

Behavior of Metals and Alloys in Melting and Congealing ; Malleable Iron Castings ; Wrought Iron or Mitis Castings ; Manufacture of Steel Castings ; Casting of Brass ; Casting of Bronze ; Bell Founding ; Chill Casting ; Casting without Core ; Casting on to other Metals ; Casting Iron and other Metals upon Lace, Embroideries, Fern Leaves and other Combustible Materials ; Some Modern Bronzes.

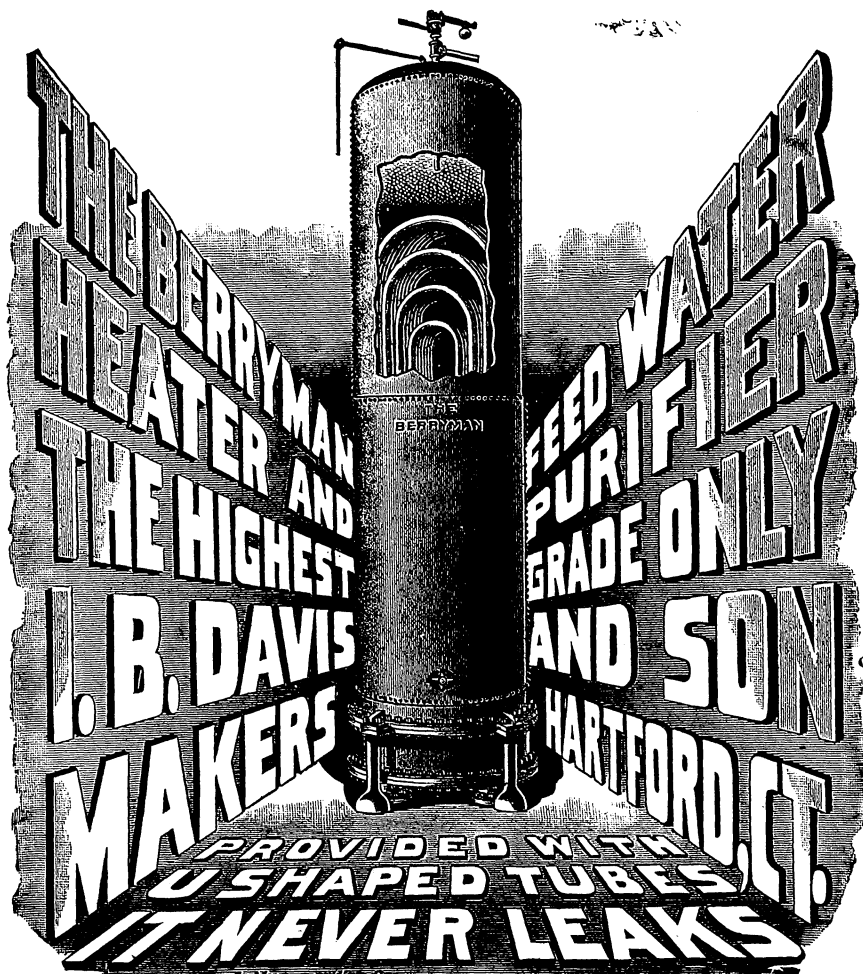
In one volume, 12mo, 400 pages, \$2.50.

Sent, post-paid, on receipt of price by

DAVID WILLIAMS,

Bookseller and Publisher,

96 - 102 READE ST., N. Y.

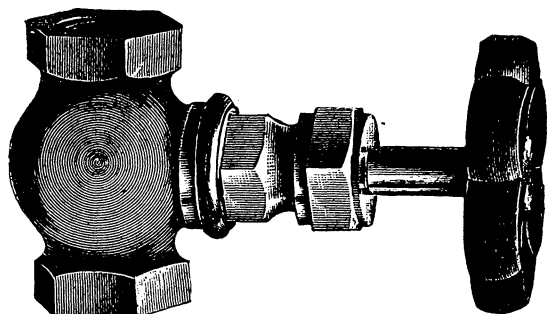


SEND FOR CATALOGUE A.

**BLAST FURNACES,
ROLLING MILLS,
STEEL WORKS,
MINES, ETC.,
ETC.**



**OIL WELLS,
REFINERIES,
ELECTRIC LIGHT PLANTS
WATER WORKS, ETC.,
ETC.**



McNAB & HARLIN MFG. CO.,
—MANUFACTURERS OF—
BRASS COCKS AND VALVES
For Steam, Water and Gas.

Wrought Iron Pipe and Fittings. Plumbers' Materials. Seamless
Brass and Copper Tubes.

Factory, PATERSON, N. J.

56 JOHN ST., N. Y.

Catalogue and Price-List will be sent to the Trade with their first order, or by express, if desired, before ordering.



THE CONTINENTAL IRON WORKS.

West and Calyer Streets, BROOKLYN, N. Y.,

—SOLE MANUFACTURERS OF—

**CORRUGATED FURNACES, FOR MARINE AND
LAND BOILERS.**

Made in sizes from 28 in. to 60 in. diameter, with flanged or plain ends.

Take Ferry from East 10th or 23d Streets, N. Y., to Greenpoint.

Thos. F. Rowland, Pres. Warren E. Hill, } Vice-Pres.
Thos. F. Rowland, Jr., Treas. Chas. H. Corbett, }

AUTOMATIC REGISTER.

The most accurate and reliable counter manu-
factured. Made entirely of metal.



Handsomely finished. Can be used on any
machine. Send for circular.

G. EDW. OSBORN & CO.,
391, 393 & 395 State St., New Haven, Conn

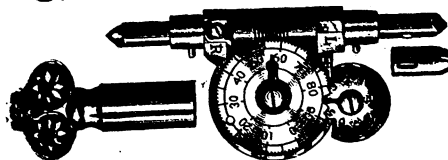
DURANT COUNTING MACHINES.



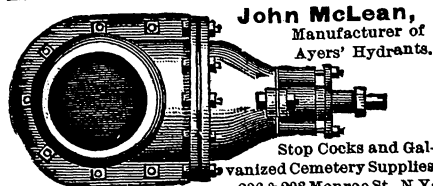
Send for
Catalogue
to

W. N. DURANT, 234 22d St., Milwaukee, Wis.,
Exhibit in Gallery, Manufacturers Build-
ing, World's Columbian Exposition, Section
E, Col. T-108 and active exhibit in Machinery
Hall.

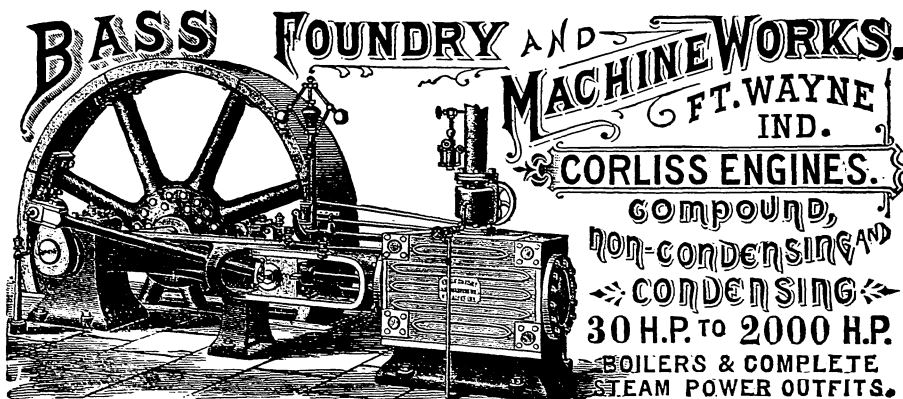
**CHURCH'S DOUBLE AND SINGLE
SPEED INDICATORS.**



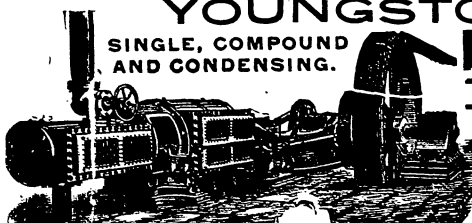
CHURCH & SLEIGHT, 109 FULTON ST., N. Y.



Stop Cocks and Gal-
vanized Cemetery Supplies
296 & 298 Monroe St., N. Y.



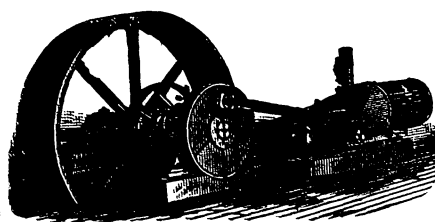
WILLIAM TOD & CO.
YOUNGSTOWN, OHIO.



**PORTER-HAMILTON
ENGINE**

Blowing Engines,
Hydraulic Cranes & Accumulators
Heavy Special Machinery.
ENGINE CATALOGUE ON APPLICATION.

BUCKEYE ENGINE COMPANY'S EXHIBIT AT THE WORLD'S FAIR.



20 and 32½ and two 36 x 48 Triple
Expansion, 1250 H.-P.

14 x 24 and 28 x 24 Cross Com-
pound, 325 H.-P.

11 and 21 x 16 Tandem Compound
185 H.-P.

16½ x 30, 180 H.-P.

13 x 21, 130 H.-P.

13 x 16, 13 H.-P.

A cordial invitation is extended to all persons interested in engineering to make our exhibit in Machin-
ery Hall their headquarters while visiting the Fair.

The PHENIX IRON WORKS, COMPANY, Meadville, Pa., respectfully invites

YOU

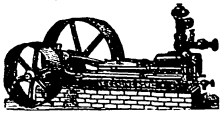
to call and see their exhibit of "DICK & CHURCH" high speed engines, World's Columbian Exposition, Chicago, Ill., Machinery Department Building, Section C, Column No. 7.

One Single Cylinder Engine of 250 H.-P.
One Tandem Compound Engine of 250 H.-P.
One Triple Expansion Engine of 500 H.-P.

ESTABLISHED 1879. INCORPORATED 1893.

ERIE ENGINE WORKS

(CLEVELAND & HARDWICK.)

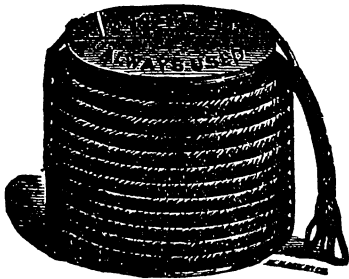


ERIE, PA.

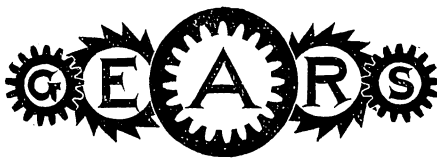
Manufacturers of

STEAM ENGINES AND BOILERS.

ROLLASON GAS ENGINES
RELIABLE AND ECONOMICAL
Send for Catalogue, etc. HAVEMEYER BLDG. NEW YORK



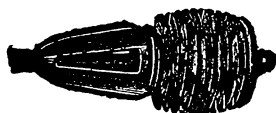
Send for a Sample of
Morrison's Patent Self-Lubricating Packing.
ROBT. MORRISON,
5034 Arsenal St., St. Louis, Mo.



Every style large or small. (See Catalogue).
BOSTON GEAR WORKS, 37 Hartford St., Boston, Mass

BEVEL GEARS
PLANED PERFECTLY BY PATENTED PROCESS
GLEASON TOOL CO.
ROCHESTER, N.Y.

THE PEERLESS.



6 Inches and Over.

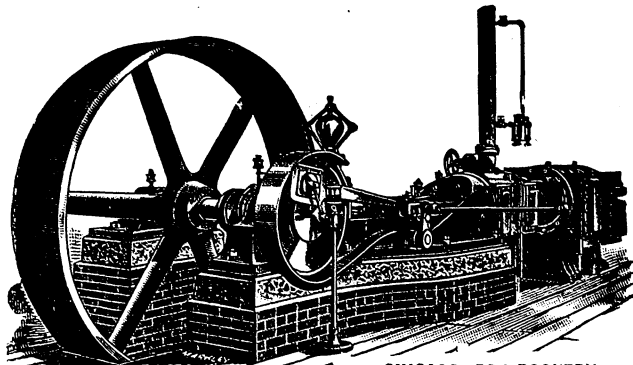


Under 6 Inches.

STEEL
Flue Cleaner.

From 1½ to 16 in.

For descriptive circular and prices, address the Manufacturer.
Jas. T. Mackay,
St. Louis, Mo.



CHICAGO, 554 ROOKERY.
ST. LOUIS, 32 LACLEDE BLDG.

SOUTHWARK
FOUNDRY AND
MACHINE CO.,
Philadelphia, Pa.

Sole Makers of

THE PORTER-ALLEN
AUTOMATIC ENGINE,
SIMPLE, COMPOUND
OR TRIPLE EXPANSION.

Also Builders of
BLOWING ENGINES,
REVERSING ENGINES,
CENTRIFUGAL PUMPS,
BOILERS, TANKS, ETC.

POWER FROM GASOLINE.

DIRECT FROM THE TANK.

CHEAPER THAN STEAM.

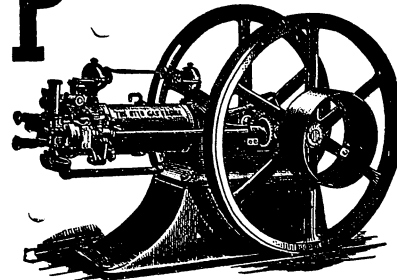
No Boiler. No Steam. No Engineer.

For Use Everywhere.

OTTO GASOLINE ENGINES,

Stationary or Portable.

1 to 50 H. P. 8 to 20 H. P.



Running Expenses, Less than one cent per horse power per hour.

For large engines, one-half cent per horse power per hour.

Suitable for all manufacturing purposes, Electric Lighting, Town Water Supply.

The Best Auxiliary Power for Night Work.

OTTO GAS ENGINE WORKS,

33d and Walnut Sts.,
PHILADELPHIA, PA.

CHICAGO OFFICE:
245 Lake St.

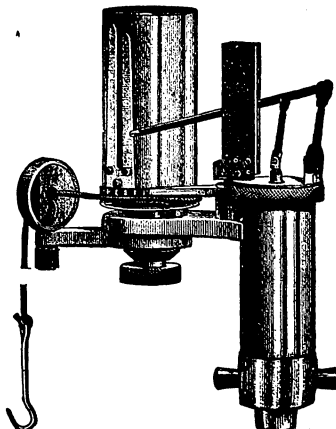
BOSTON OFFICE:
19 Pearl St.

E. L. MAXWELL, Pres. C. A. MOORE, Vice-Pres. H. S. MANNING, Treas. M. LUSCOMB, Sec.

THE ASHCROFT MANUFACTURING COMPANY

SOLE MANUFACTURERS OF

THE TABOR STEAM ENGINE INDICATOR.



The only instrument that will make accurate diagrams at either high or low speeds. In use all over the World where accuracy is desired. Approved and adopted by United States Government on the new Cruisers.

Use the Coffin Averaging Instrument; determines the area of any irregular figure. Gives mean effective pressure (M. E. P.) of an indicator diagram without computation. Absolute accuracy. Easy to manipulate. No liability to error. One diagram per minute measured without effort.

Also Steam and Vacuum Gauges, with Patent Seamless Drawn Tube, Steam Traps, Packer Ratchet Drills, Stanwood Cutters, Marine Clocks, Engine Revolution Counters, Test Gauges, Oil Cups, Test Pumps, Locomotive Spring Balances, Steam Whistles, Salinometers, and all instruments for Measuring Steam, Air, Gas, or Water.

Office and Salesroom, 111 Liberty St., N. Y.

Factory, Bridgeport, Conn.

Address all Letters to P. O. Box 3754, New York.

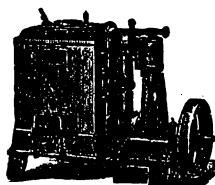
Exhibit at World's Columbian Exposition, Section No. 25 Columns K. 24 and 25, Main Center Aisle, Machinery Hall.

Pennsylvania Diamond Drill & Manufacturing Co.

BIRDSBORO, PA.

Drill Press and Planer Chucks. Steam and Gas Engines. Diamond Pointed Core Prospecting Drills. Boiler Fronts and General Castings. Mineral Lands Prospected and Artesian Wells Bored by Contract

CHICAGO MACHINERY & ENGINEERING CO., Western Sales Agents, Chicago, Ill.



The Shipman Automatic Steam Engine.
PETROLEUM OR KEROSENE FUEL.

1, 2, 6, 8 Horse-Power, Single.
8 and 22 " Compound.

STATIONARY or MARINE.

No SKILLED ENGINEER.

SEND FOR CATALOGUE.

SHIPMAN ENGINE CO.,

200 Summer St., Boston, Mass.
San Francisco

New Orleans,

New York.

Chicago.

Awarded the Grand Prize at Late Paris Exposition.

SEND FOR THIS BOOK
FREE ON APPLICATION.

THE BABCOCK & WILCOX CO. WATER TUBE STEAM BOILERS

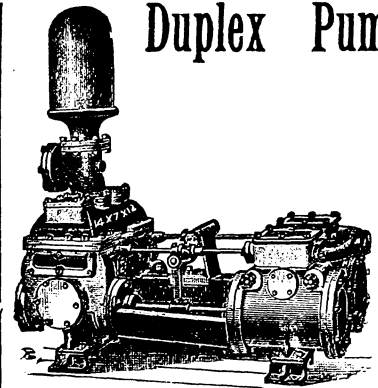
30 CORTLANDT ST. N.Y.

BRANCH OFFICES:

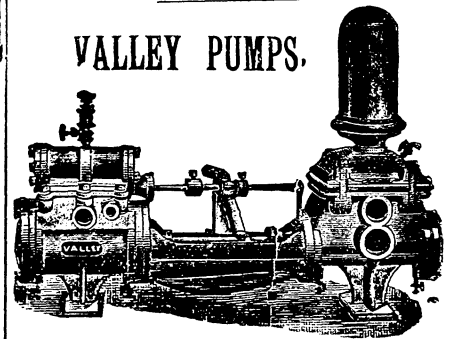
- BOSTON, MASS. 8 OLIVER ST.
- PHILADELPHIA, PA. 32 N. 5TH ST.
- PITTSBURGH, PA. 408 LEWIS BLOCK
- CLEVELAND, O. 412 PERRY-PAYNE BLDG.
- CHICAGO, ILL. 45 S. JEFFERSON ST.
- MINNEAPOLIS, MINN. 604 CORN EX.
- NEW ORLEANS, LA. 57 CARondelet ST.
- HAVANA, CUBA. 116 CALLE DELA HIZADA.

MANUFACTORIES IN UNITED STATES, SCOTLAND, FRANCE, GERMANY & AUSTRIA.

Duplex Pumps.

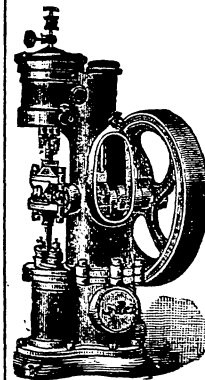


VALLEY PUMPS.



ACME

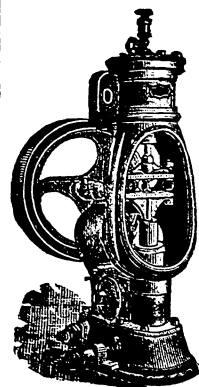
Steam Pumps



For Feeding Boilers or
forcing water against
heavy pressure.

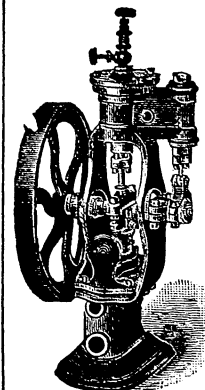
BUCKET
PLUNGER

Steam Pumps for feed-
ing Boilers, filling
Tanks, or Fire
purposes.



A. B. C.

Steam Pumps



The best low price
pump in the
world.

VALLEY PUMP WKS.

EASTHAMPTON, MASS.

Chicago Agency: 15 So. Canal St.,

R. POOLE & SONS

BRASS ROLLING MILLS, SHAFTING, PULLEYS, MACHINERY, FLYWHEELS, WATER-WHEEL, FACILITIES FOR HEAVIEST WORK, BALTIMORE, MD., U.S.A.

ROCK DRILLING AND AIR COMPRESSING

MACHINERY

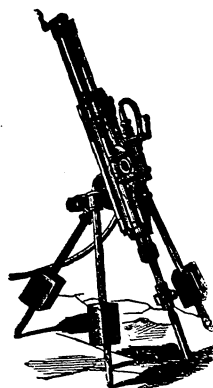
—FOR—
TUNNELS, QUARRIES,
MINES, RAILROADS,

And wherever Ore and Rock are to be Drilled
and Blasted.

RAND DRILL CO.,

23 Park Place, New York.

Branch Offices: Monadnock Building, Chicago; Ishpeming, Mich.;
1216 18th Street, Denver; Sherbrooke, P. Q., Canada; Apartado 830,
Mexico City.



Haines Gauge Co.,
906 Filbert St.,
PHILADELPHIA,
PA., U. S. A.



The HAINES Automatic Micrometer Rolling
Mill GAUGE.

For reducing HOT WORK in process of rolling

THE LANE & BODLEY CO.,

Cincinnati, O.

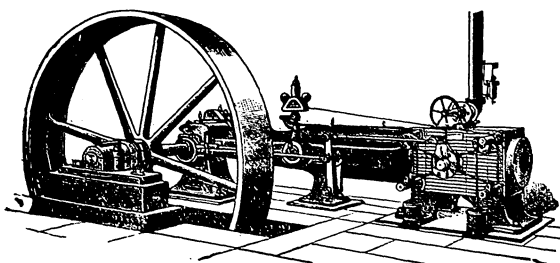
ENGINES,

ALL SIZES

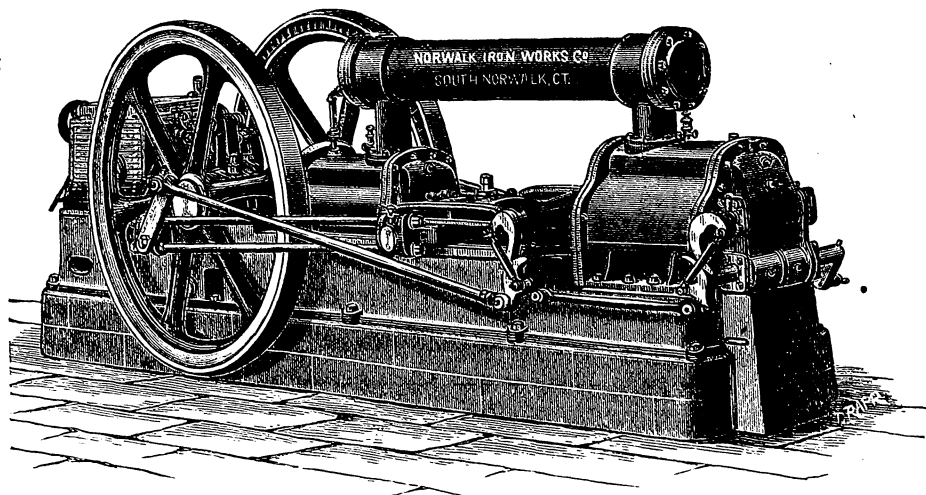
Simple and Compound,
CORLISS ENGINES A SPECIALTY.

Heavy Slide Valve Engines.

Shafting, Hangers, Pulleys,
Belt Elevator, etc.



Air Compressors.



THE NORWALK IRON WORKS CO., South Norwalk, Conn.



**CHEAPEST.
HANDIEST.
SIMPLEST.**

PUMPS

Handling Dirty, Gritty and Sandy Liquids without Wear, Oil or Care. Pumping outfit for Contractors, Mining, Irrigating, Railroad Quarry, Drainage and Manufacturing purposes. Second-hand Engines, Boilers, Pumps, and other Machinery always on hand. Exchanging

MASLINS, 165-167 First St. Jersey City, N.J.

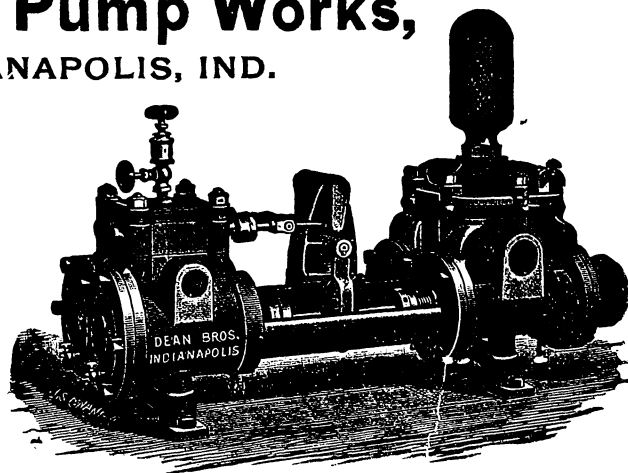
DEAN BROTHERS'
Steam Pump Works,
INDIANAPOLIS, IND.

DUPLEX PUMPS.

SINGLE PUMPS.

**DEEP WELL
PUMPS.**

Send for Catalogue
and Prices.



SEAMLESS

COPPER FLOATS

AND

AIR CHAMBERS.

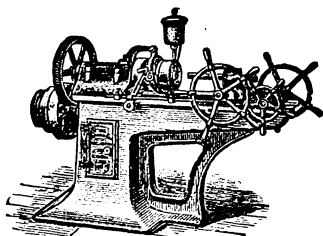
Made in all sizes and shapes by a New Process. Guaranteed to stand 50% more pressure than any other make.

SEND FOR PRICES.

**SPRINGFIELD BRASS CO.,
SPRINGFIELD, MASS.**

**THE NATIONAL MACHINERY CO.,
TIFFIN, OHIO**
— MANUFACTURERS OF —

BOLT AND NUT



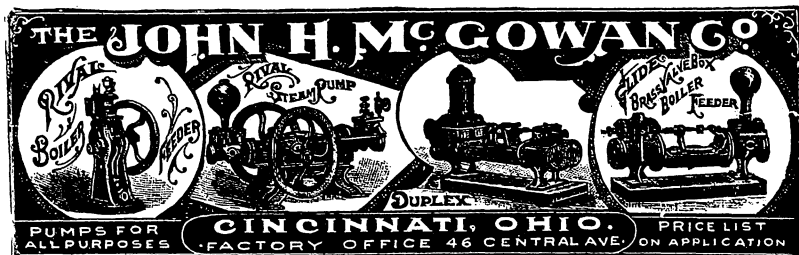
MACHINERY

OF EVERY DESCRIPTION.

Upsetters and Benders,

Car Link and Pin Machinery.

CATALOGUE SENT ON APPLICATION.



Brass Founders and Mfrs. of every description of Brass and Iron body goods for steam, gas and water.

Worthington Steam Pumps
CONDENSERS and WATER METERS.

HENRY R. WORTHINGTON,

86 & 88 LIBERTY STREET, NEW YORK.

BOSTON,

ST. LOUIS,

PHILADELPHIA,

DENVER.

CHICAGO

The WATERBURY-FARREL FOUNDRY & MACHINE CO., Waterbury, Connecticut,

Builders of Rolling Mill Machinery, Special Machines for finishing and making goods from Sheet Brass, Copper, Steel Silver, &c., **POWER PRESSES, HYDRAULIC PRESSES,** Drop Presses, Foot Presses, **RIVET MACHINES,** Gang Slitters, Grinding Machines, Steel Rolls, Wire Mill Machinery, Tube Drawing Machinery, Dies, &c.

The Brown Hoisting and Conveying Machine Co.,

CLEVELAND, OHIO, U. S. A.,

Sole manufacturers of the

"BROWN HOIST"

A NEW AND COMPLETE SYSTEM FOR HANDLING OF MATERIALS.

The Brown Patent Cable Tramway system.

The Brown Patent Suspended Beam Tramway system.

The Brown Patent Bridge Tramway system.

The Brown Patent Shed Tramway system.

The Brown Patent Furnace Stock Distributer.

The Brown Patent Warehouse Tramway system.

The Brown Patent Sewer Machine Tramway system.

The Brown Patent Continuous Elevated Tramway system.

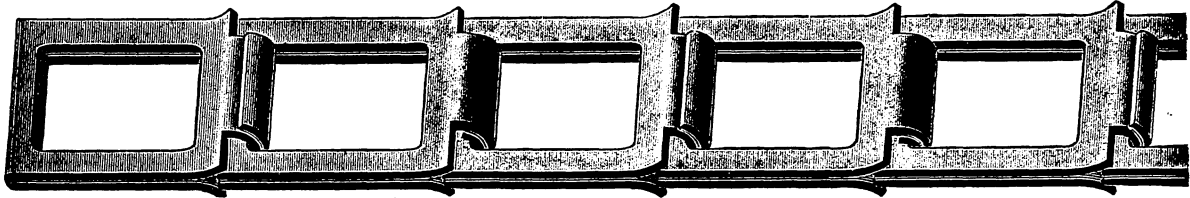
The Fayette-Brown Patent Automatic Furnace Hoist.

The Brown Patent Friction Clutch Hoisting Engine.

Self-Dumping Buckets, Skip Cars, Friction Clutches, etc.

The Most Perfect Clutch.

ROBERTS MFG. CO. - - - PITTSBURGH, PA.



PATENT DETACHABLE STEEL LINK BELTING,

Sprocket Wheels and Shafting.

Send for Catalogue and reduced Price-List.

JEFFREY CHAIN BELTING.

Also MALLEABLE, WROUGHT, STEEL AND SPECIAL CHAINS for

Elevating and Conveying Machinery

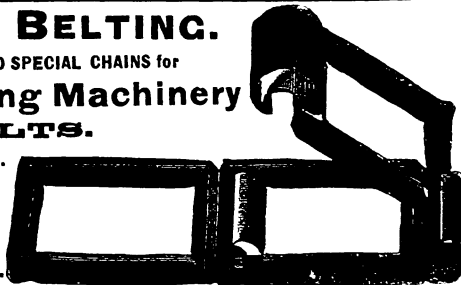
DRIVE BELTS.

Send for 1893 Catalogue and Reduced Price-List.

THE JEFFREY MANUFACTURING CO.

COLUMBUS, OHIO, U. S. A.

New York Branch, 163 Washington St.

Operated
entirely
by one
handle.

BUFFALO AUTOMATIC INJECTOR

A GRADING INJECTOR.

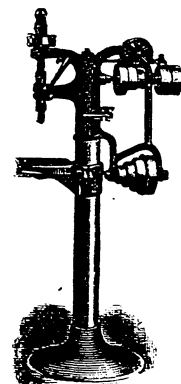
Construction and operation is such that water supply is always in proportion to supply of steam admitted and can be graded to feed continuously with steam from 20 to 140 pounds. Works perfectly whether lifting or taking supply from city pressure. Operated entirely by one handle, both in stopping and starting and grading supply of steam and water.

No Valves in
either steam or
suction pipes.

EAGLE EJECTORS, DUPLEX FLUE SCRAPPERS, FETTHOUSE GAUGE COCKS, IMPROVED GLASS OIL CUPS AND LUBRICATORS, CYLINDER OIL PUMPS, COMPRESSION GREASE CUPS, Etc. Send for Catalogue. - Mention this Paper.

SHERWOOD MFG. CO., Buffalo, N. Y.

EUROPEAN AGENTS, Green & Boulding, 21 Featherstone St., London, E. C.



The Norton Drills

for light, sensitive and rapid drilling. 1, 2, 3, 4 or more spindles, sensitive or automatic feed. To drill from 0 to 1/2-inch holes. The latest and best. Most convenient, sensitive and durable drills on the market. Have balanced spindles and balanced tables. Write for prices and description, or for special machinery.

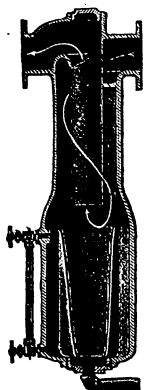
THE

NORTON & JONES MACHINE TOOL WORKS,
PLAINVILLE, CONN.

ALEXANDER BROS.

BEST OAK BELTING.

PHILADELPHIA.



TO OBTAIN DRY STEAM

STRATTON SEPARATOR

PLACE A

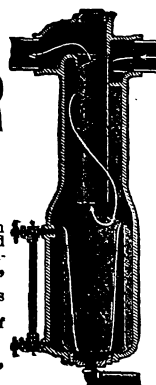
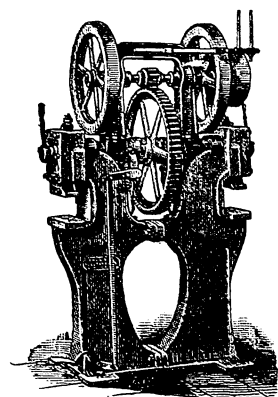
In Your Steam Pipe.

Over 400,000 Horse Power in use.

This is the only apparatus that automatically separates water from steam, and secures the maximum of Economy, Efficiency and Safety. These Separators are used by the U. S. Navy, by the leading Electric Light Cos., Sugar Refineries, Paper Mills, Water Works, Railroads and Steam Vessels. Steam Chimneys or Drums are unnecessary when this Separator is used.

Send for our new publication, "Dry Steam the Foundation of Economy." Sent free on application.

The GOUBERT MFG. CO., Sole Mfrs., 32 Cortlandt St., New York.

THE LONG & ALLSTATTER CO.,
HAMILTON, O.PUNCHES, SHEARS
AND HAMMERS.

Double, Single, Horizontal, Twin-Boiler, Spacing Gate, Multiple Angle Bar, &c. Belt and Steam Driven.

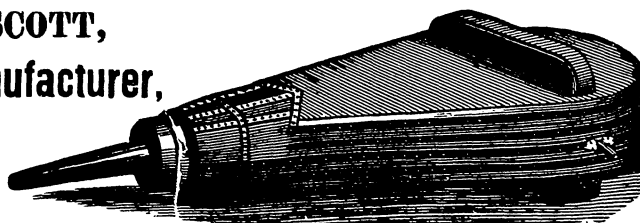
SEND FOR CATALOGUE.

GEO. M. SCOTT,
Bellows Manufacturer,

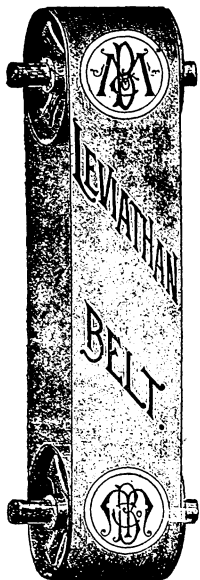
Johnson Street

Cor. 22d St.,

CHICAGO, ILL.



LEVIATHAN BELTING.



Positively unequalled for Strength, Durability and Traction Power; unaffected by Heat, Steam or Water.

Belts for Main Driving and work of a heavy nature a specialty.

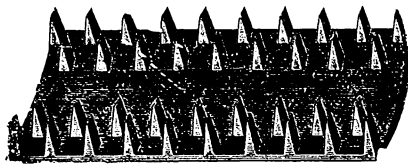
MAIN BELTING COMPANY,

Sole Manufacturers,
1219-1235 Carpenter St.,
PHILADELPHIA.

248 Randolph Street, Chicago.
120 Pearl Street, Boston

Send for Price-Lists and Samples.

Talcott's Original Wilson Belt Hooks



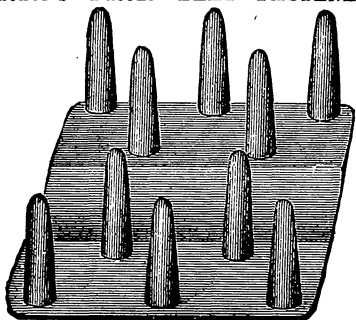
W. O. TALCOTT, Providence, R. I.

MANUFACTURER OF

Four Styles of BELT HOOKS, Including 134 Sizes.

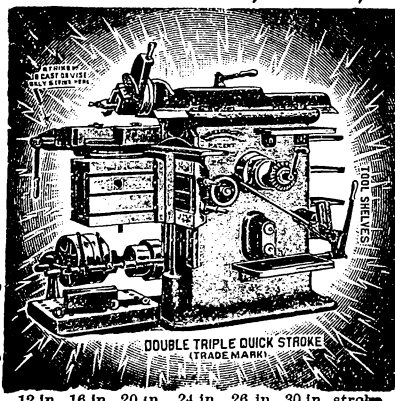
SEND FOR CATALOGUE.

Thacher's Patent BELT FASTENERS.



Manufactured by
The Claffen Manufacturing Co., Cleveland, O.
Office, 71 and 73 Ontario St.

FOR THE
"Double Triple Quick Stroke"
SHAPER
WRITE TO
GOULD & EBERHARDT, Newark, N.J.



12 in., 16 in., 20 in., 24 in., 28 in., 30 in. stroke.

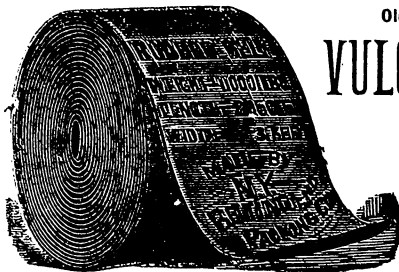
NEW YORK BELTING & PACKING CO. LTD

JOHN H. CHEEVER,
President.

15 Park Row, New York.

Oldest and Largest Manufacturers in the U. S. of

VULCANIZED RUBBER FABRICS



For Mechanical Purposes.

MACHINE BELTING

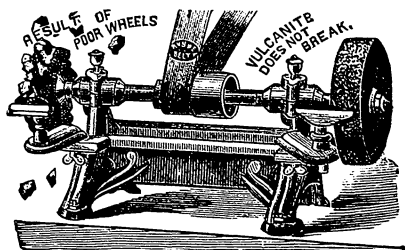
With Smooth Metallic Rubber Surface.



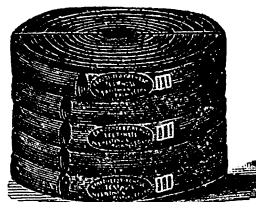
RUBBER TEST HOSE

COTTON "CABLE" HOSE, CIRCULAR, WOVEN, SEAMLESS ANTISEPTIC

For the use of Steam and Hand Fire Engines, Force Pumps, Mills, Factories and Steamers.



Rubber Cement.



THE ORIGINAL SOLID VULCANITE EMERY WHEELS.

RUN EASY and SAFE, COOL and TRUE. ARE MORE DURABLE—HENCE CHEAPER. A trial will convince you of this. KNIFE GRINDING WHEELS A SPECIALTY.

Rubber Goods to Order for all Mechanical Purposes.

SALESROOMS:

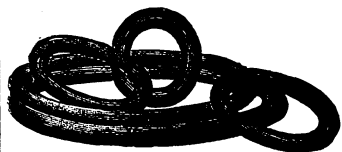
PHILADELPHIA, 308 Chestnut St.
BOSTON, 44 Summer St.
CHICAGO, 151 Lake St.
DENVER, 1601-1611 17th St.
CHARLESTON, 160 Meeting St.
CINCINNATI, 227 West 4th St.
MINNEAPOLIS, 200 1st Ave. South.
CLEVELAND, 176 Superior St.

SALESROOMS:

SAN FRANCISCO, 17 Main St.
DETROIT, 16-20 Woodward Ave.
BALTIMORE, 12 N. Charles St.
NEW ORLEANS, 8-12 N. Peters St.
KANSAS CITY, 1811 and 1813 W. 12th St.
ST. LOUIS, 616 Locust St.
DALLAS, 173 Elm St.

H. O. CANFIELD,

MOULDED BRIDGEPORT, CONN.



RUBBER GOODS Small moulded work a specialty. Send for estimates for moulds and work.
FOR MECHANICAL PURPOSES.

Smoke Stacks

— AND —

Boiler Fronts

When painted with Dixon's Silica-Graphite Paint will resist the action of salt air, sulphurous vapors, etc., and give entire satisfaction.

So say those who have used it for many years. Send for circulars to

JOS. DIXON CRUCIBLE Co.,
JERSEY CITY, N. J.

E. W. BLISS CO.

11 ADAMS ST.,
BROOKLYN, N. Y.

Western Office, 14 N. Canal St.,
CHICAGO, ILL.

PRESSES
DIES,
SHEARS
DROP
HAMMERS,
AND
SPECIAL
MACHINERY.



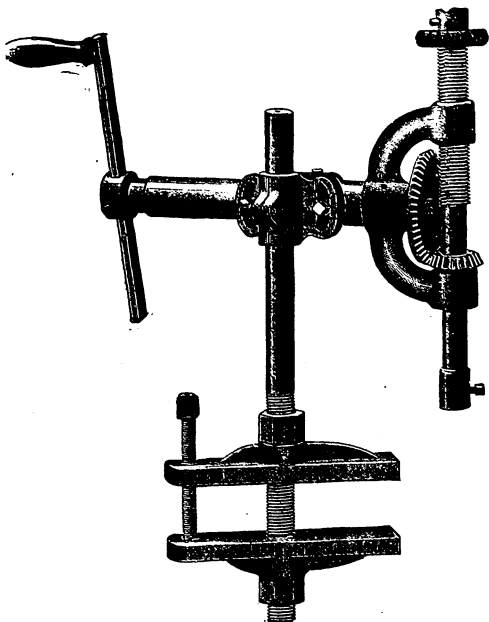
PARTIAL VIEW OF OUR EXHIBIT.

DO NOT FAIL TO CALL WHEN AT THE FAIR, SEC. 28,
MACHINERY HALL ANNEX.

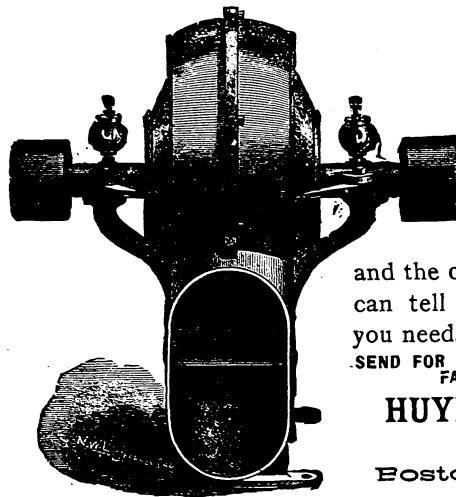
Owners also of THE STILES & PARKER PRESS CO.

CLAMP DRILLS.

- No. 1 will drill a $\frac{5}{8}$ inch hole, $2\frac{1}{4}$ inches deep.
Weight, 30 lbs. Price, \$15.00.
- No. 2 will drill a 1 inch hole, $2\frac{1}{4}$ inches deep.
Weight, 40 lbs. Price, \$20.00.
- No. 3 will Drill a $\frac{5}{8}$ inch hole, 4 inches deep.
Weight, 40 lbs. Price, \$20.00.
- No. 4 will drill a 1 inch hole, 4 inches deep.
Weight, 50 lbs. Price, \$25.00.



THE GEO. BURNHAM CO.,
WORCESTER, MASS.



IN EVERY line of manufacture
there is always a leader.

The Huyett & Smith Mfg. Co.
Detroit, Mich., are the leading manu-
facturers of Forge and Pressure
Blowers—saving fifty per cent. in
power over all other Blowers.

Send inside diameter of Cupola
and the combined area of all openings, and we
can tell at once the size of the Blower that
you need.

SEND FOR OUR ILLUSTRATED CATALOGUES OF HEATERS,
FANS, DUST ARRESTERS AND DRY KILNS.

HUYETT & SMITH MFG. CO.,
DETROIT, MICH.
Boston Chicago, New York.

BOILERS

WE make a better stationary tubular
boiler, make it of flange steel, with
weldless braces and eclipse manholes,
and sell them for one-third less than
the old style. Send for lithographs and
detail illustrations.

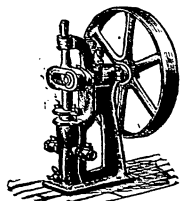
Fulton Steam Boiler Works & Foundry
RICHMOND, IND.

POWER BOILER FEED PUMP.

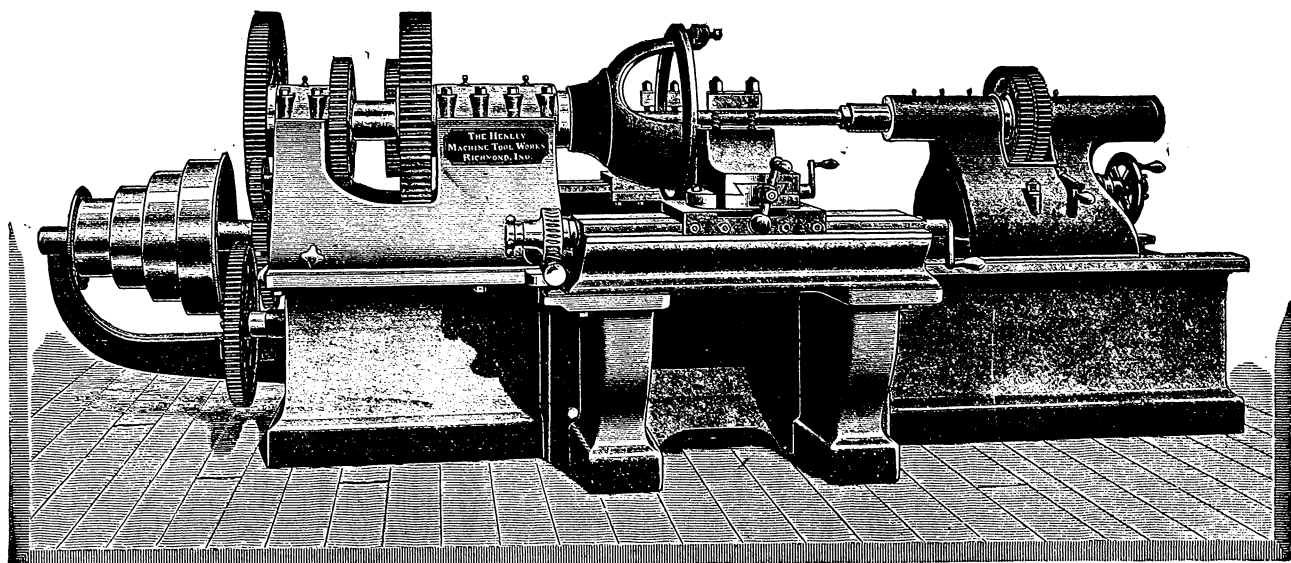
From 2 to 80 horse-power. Neat in design. Self-contained easy motion.
Durable and reliable. Strong built, large bearings.

Send for Catalogue and Prices and mention this paper.

C. O. LUCAS & CO., Greenville Ohio.



PULLEY LATHES



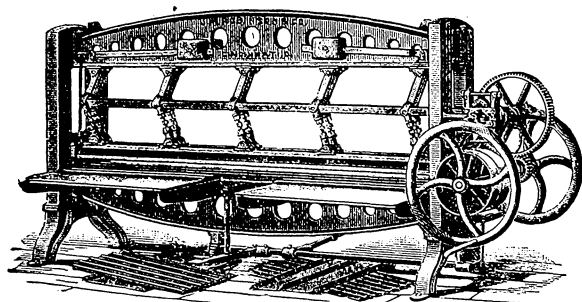
Patented Feb. 17, 1891 ; June 14, 1887.

This cut represents the 42-inch Lathe. The 60-inch Lathe is of same design, but much heavier throughout. The 30-inch Lathe is of same general construction, with the bed supported on feet at each end.

These Lathes are especially designed for Simultaneously Boring and Turning Pulleys, both straight and crowning face, Cone Pulleys, Gear Blanks, and a variety of other work.

MANUFACTURED BY

THE HENLEY MACHINE TOOL WORKS, Richmond, Indiana.



Roofing Machine.

For forming sheet metal Roofing, Siding, Ceiling, Weather Boarding, Skylight Bars, Metal Lath, Gutters, Ridge Cap, Escalloped Steel Sheets and Cattle Troughs. Made by

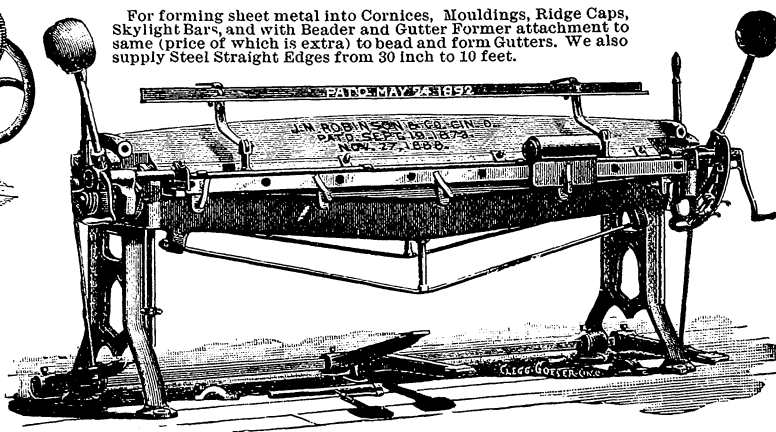
J. M. ROBINSON & CO.,

225-229 West 2d St.,

CINCINNATI, O.

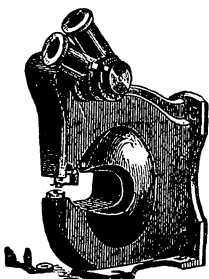
The "Globe" Cornice Brake.

For forming sheet metal into Cornices, Mouldings, Ridge Caps, Skylight Bars, and with Beader and Gutter Former attachment to same (price of which is extra) to bead and form Gutters. We also supply Steel Straight Edges from 30 inch to 10 feet.



Improved Pat. Combined Punch and Stock Shears. (7) different sizes from 200 to 1000 lbs. for light or heavy work, 6 to 16 in. throat punch. A general purpose tool adapted for punching and cutting bar and sheet iron as desired. Also make a similar Punch or Stock Shear separate, Power Punches, Improved Pat. Slip Roll Formers, Plate Straightening Rolls, &c. Labor-saving Machines for working Sheet Metal.

SEE THIS SPACE NEXT ISSUE.



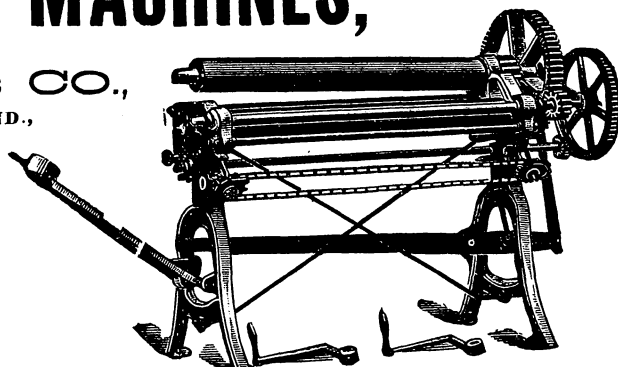
General Purpose Punches.
Powerful & Substantial.

A FEW GOOD MACHINES,

MADE BY

BERTSCH & CO.,

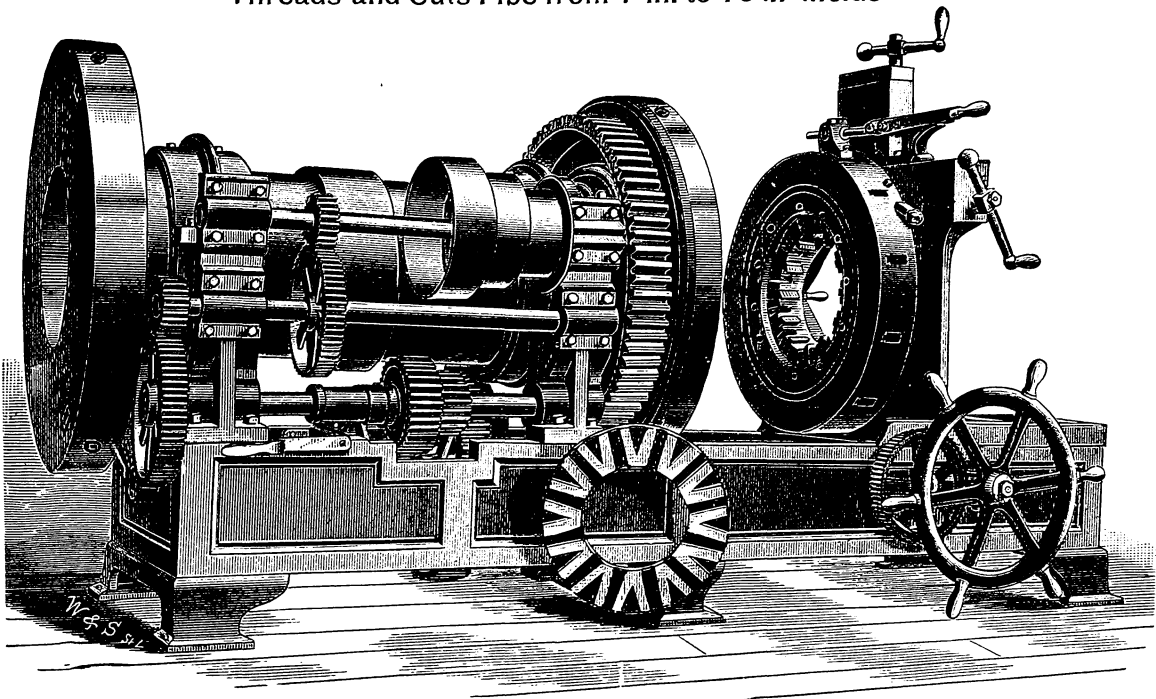
CAMBRIDGE CITY, IND.,



New Patent Quick Adjustable Slip Roll Formers. A revolution in quickness and ease of adjustments, and opening the roll in one operation in elevated position as shown to remove the metal. All sizes from 2 in. to 12 in. rolls for large plates. Also similar Crimping or Corrugating Rolls, Improved Plate Straightening Rolls and Tools for working Sheet Metal. Notice this space next week.

DUPLEX MILL MACHINE No. 16.

Threads and Cuts Pipe from 7 in. to 16 in inclusive.



Circulars of all sizes of Pipe Threading and Cutting Machines sent on application.

BIGNALL & KEELER MFG. CO., St. Louis, Mo.

G. A. Crosby & Co.,

176 and 178 So. Clinton St.
CHICAGO, ILL., U. S. A.

MANUFACTURE

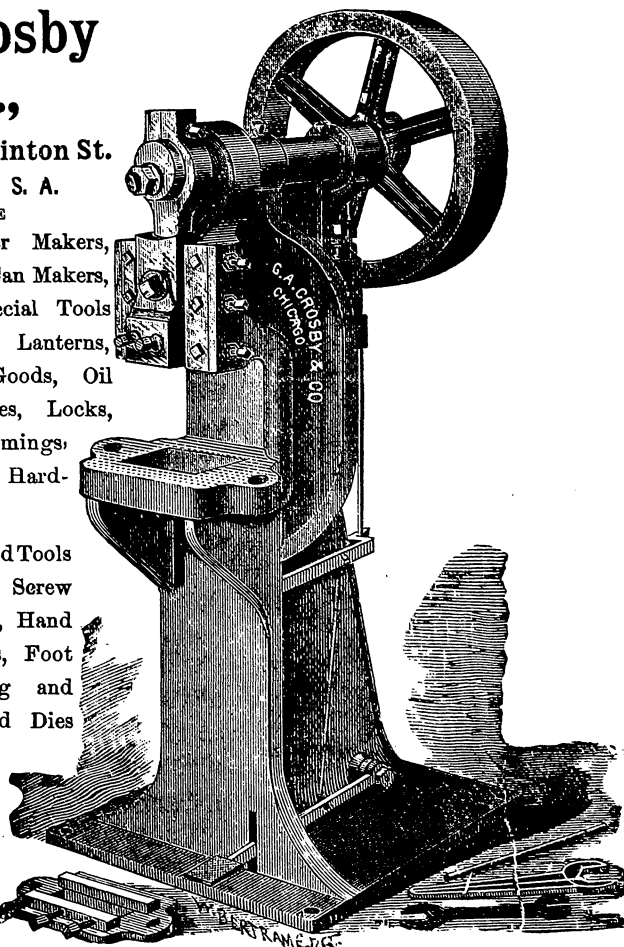
Machinery for Boiler Makers,
Sheet Metal Workers, Can Makers,
Soap Makers and Special Tools
to order for making Lanterns,
Bird Cages, Wire Goods, Oil
Stoves, Vapor Stoves, Locks,
Hinges, Trunk Trimmings,
Brass Goods and all Hard-
ware Novelties.

Among their Standard Tools
are Power Presses, Screw
Presses, Foot Presses, Hand
Presses, Drop Presses, Foot
and Power Squaring and
Trimming Shears and Dies
of every description.

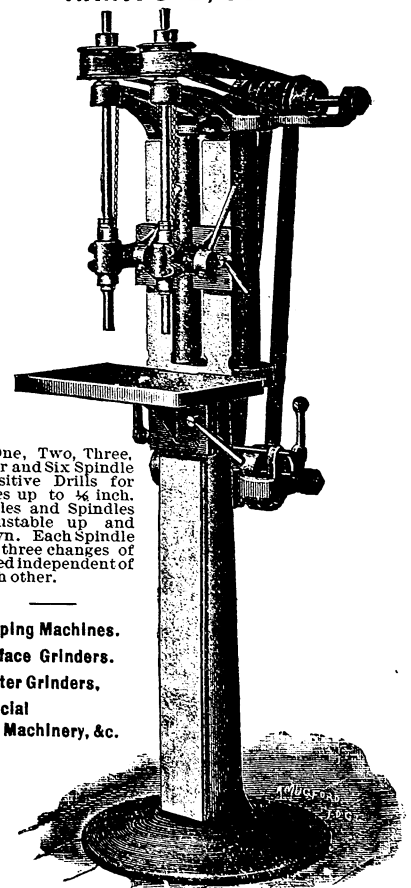
Write for Prices.

**Work Guaranteed
the Best.**

Agents for the Clark Per-
fection Kerosene Oil System,
or heating soldering appa-
ratus.



Woodward & Rogers, HARTFORD, CONN.



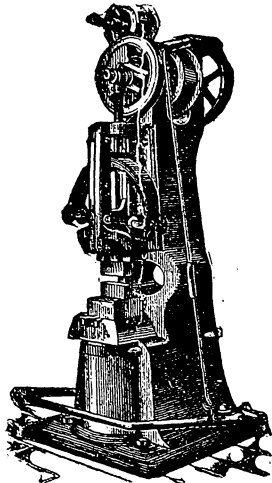
One, Two, Three,
Four and Six Spindle
Sensitive Drills for
holes up to $\frac{1}{4}$ inch.
Tables and Spindles
adjustable up and
down. Each Spindle
has three changes of
speed independent of
each other.

**Tapping Machines.
Surface Grinders.
Cutter Grinders,
Special
Machinery, &c.**

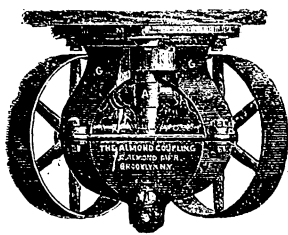
If You Use Power Hammers

Write to us for Circulars.

BELDEN MACHINE CO
NEW HAVEN, CONN.



Chicago Office, 65 South Canal Street.



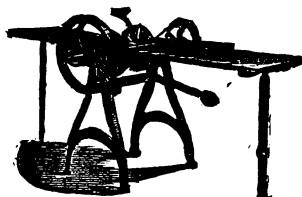
THIS CUT REPRESENTS
ALMOND'S PAT. QUARTER-TURN COUPLING
To Replace Mule Pulleys and Bevel Gears.

It is a noiseless quarter-turn countershaft, self-contained, perfectly lubricated, and gives no trouble. Send for particulars.

T. R. ALMOND, 83 and 85 Washington Street,
Brooklyn, N. Y.

BARNES

Hand and Foot Power Machinery,
FOR CARPENTERS AND BUILDERS.



Complete Line
of Seven
Machines.
Hand Circular
Rip Saw
Combined Rip and
Cross-Cut Saw
(with Scroll Saw
and Boring At-
tachments).
Scroll Saw, For-
mer, Mortiser,
Tenoner & Lathe

Discounts to the trade on application. Send for
Catalogue and Price-List.

W. F. & JOHN BARNES CO.,
69 Ruby Street, ROCKFORD, ILL.
ENGLISH AGENTS, CHAS. CHURCHILL & CO.,
21 Cross Street, Finsbury, E. C., London

THE VALLENTINE TOOL CO.,

223 State St., Hartford, Conn.

— MANUFACTURE —

**STEEL RULES, FLEXIBLE
and SPRING TEMPER.**



SEND FOR LIST AND DISCOUNTS.

LINK-BELT

ENGINEERING CO
NICETOWN,
PHILA
49 DEY ST.
NEW YORK

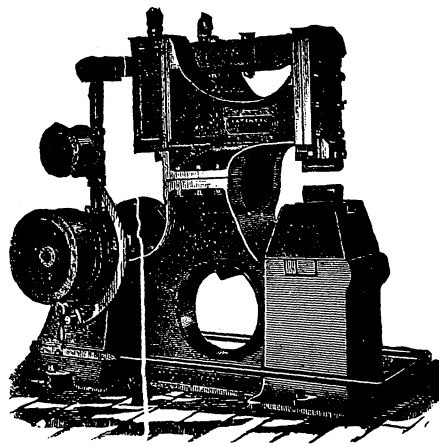
Elevators, Conveyors, Manila Rope Power Transmission Machinery, Ewart Detachable Link Belting
Dodge Chain, Howe Chain, &c.

General Eastern Agents for Fibre-Graphite Journal Bearings for shafting and machines. Require no oil
or other lubricant. Moderate in price, durable and guaranteed. Bearings furnished to fit hangers now
in use.

WESTERN CONNECTION:

[CHICAGO,] LINK BELT MACHINERY CO.

JENKINS' POWER HAMMERS.



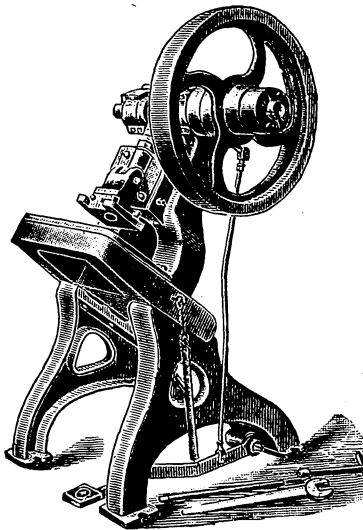
Adjustable and elastic stroke,
nicety of regulation, efficiency of
action, simplicity and durability of
construction and the absence of
leather straps, steel springs and all
complication, combine to make this
hammer the favorite wherever used.

JENKINS & LINGLE,
BELLEFONTE, PA.

Presses, Dies, Presses, OF ALL KINDS FOR Sheet Metal Ware.

Difficult and Intricate Drawing
Stamping, Embossing, Wiring,
Blanking and Combination
Dies a Specialty.

SUBMIT SAMPLES AND WRITE FOR PRICES.



Stark Machine & Tool Co.,
BUFFALO, N. Y.

Send for Catalogue and mention "The Iron Age."

JOHN ADT & SON,

New Haven, Conn.

BUILDERS of MACHINERY for HARDWARE MANUFACTURE.

BUTT MILLING MACHINERY,

BUTT DRILLING MACHINERY,

RIVETING MACHINES,

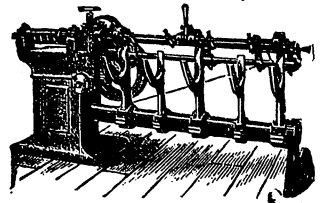
WIRE STRAIGHTENING

MACHINERY,

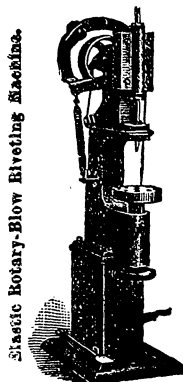
FOOT PRESSES,

SPRUE CUTTERS,

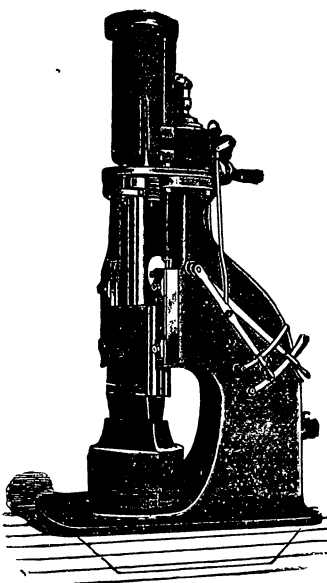
ETC.



Automatic Wire Straightening and Cutting Machine.



Static Rotary-Blow Riveting Machine.



Bement, Miles & Co.,

PHILADELPHIA, PA.,

Builders of

Metal-Working Machine Tools

For railroad shops, locomotive and car builders,
machine shops, steam forges, shipyards, boiler
shops bridge works

**Steam Hammers for Working Iron
or Steel.**

NEW YORK OFFICE. Equitable Building.

GEORGE PLACE, Agent

THE STURTEVANT STEEL PRESSURE BLOWERS

For Cupola Furnaces and Forges.

THE STURTEVANT SYSTEM

—OF—

Heating and Ventilating

MANUFACTURING ESTABLISHMENTS.

PORTABLE FORGES

SEND FOR CATALOGUES.



B. F. STURTEVANT CO.,

BOSTON, MASS.

BRANCHES: 91 Liberty St., New York. 16 So. Canal St., Chicago. 135 No. Third St., Philadelphia

PITTSBURGH MFG. CO.,

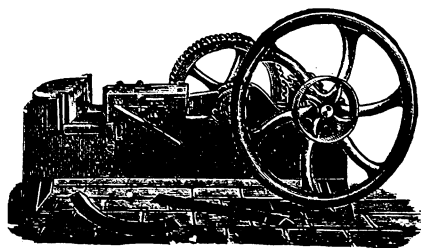
Manufacturers of

**Crosgrove's Patent Straight-
ening, Bending and Punch-
ing Machines.**

NAIL MACHINERY.

Bolts, Nuts, Rivets, Castings, &c.

PITTSBURGH, - - PA.



FITCHBURG MACHINE WORKS,

MANUFACTURERS OF THE CELEBRATED



AND OTHER

SEND FOR
CATALOGUE B.

18-inch Engine Lathe.

ENGINE LATHE

METAL-WORKING MACHINES

FITCHBURG

MASS.

CASTINGS

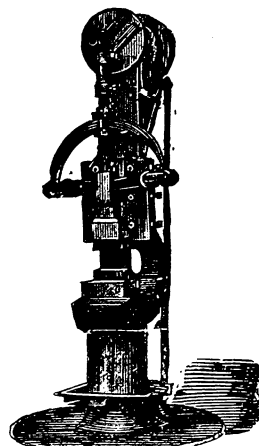
(GRAY IRON)

Made to order. Send samples for estimate

Shilling Foundry Co.,
COLUMBUS, O.

DEAD-STROKE POWER HAMMERS

CONSTRUCTION IMPROVED.
Seven Sizes.
Prices Reduced.
5 to 350 Pounds.



The 15 and 25 pound sizes are specially adapted to
filmmakers' use, the other sizes for general forging.
Send for circular and references.

DIEBELT & EISENHARDT,

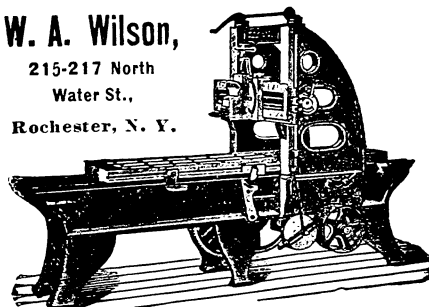
MAKERS,

1310 Howard St., Philadelphia.

W. A. Wilson,

215-217 North
Water St.,

Rochester, N. Y.



Improved Iron Planers a specialty. 20 x 20, 22 x 22
24 x 24 up to 42 x 42, to plane any length. Send for
description and price-list before purchasing. Manu-
facturers' agent for other tools and machinery. Men-
tion *The Iron Age*.

THE POWELL PLANER CO.

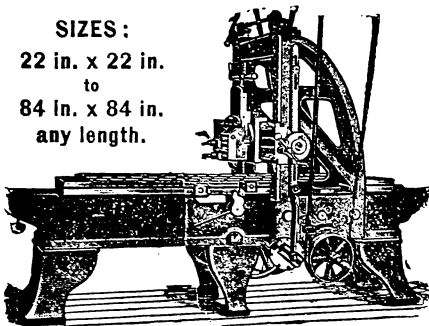
SIZES:

22 in. x 22 in.

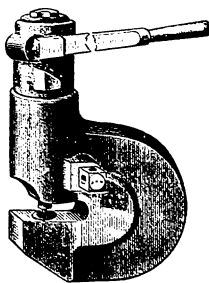
to

84 in. x 84 in.

any length.



WORCESTER, MASS.



A. L. HENDERER

Wilmington, Del.,

Manufacturer of

Hydraulic

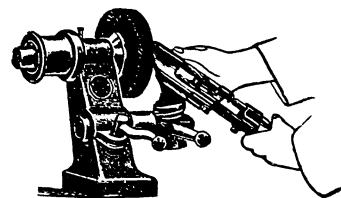
Punches,

Screw Punches,

Forged Steel Expand-
ers, Flue Hole Cutters,
Boiler Test Pumps and
Pipe Vises.

Price-lists and discounts
on application.

DRILL GRINDER.

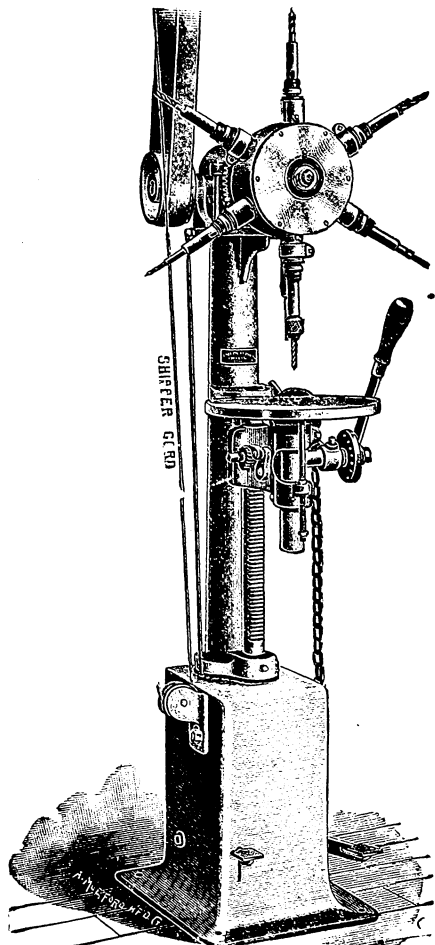


THE WASHBURN SHOPS
WORCESTER, MASS.



QUINT'S TURRET DRILLS.

SIX SPINDLE.



Speed of Drills from 250 to 2,000 revolutions, and may be changed to any intermediate speed instantly; only the Drill in use revolves, all others remain stationary.

Send for Circular. Drills from 0 to $\frac{1}{4}$ inch.

Address A. D. QUINT, Hartford, Conn.



MACHINISTS' SCALES.

PATENT END GRADUATION.

Liberal Discount to the Trade. Send for List.

COFFIN & LEIGHTON, Syracuse, N. Y.

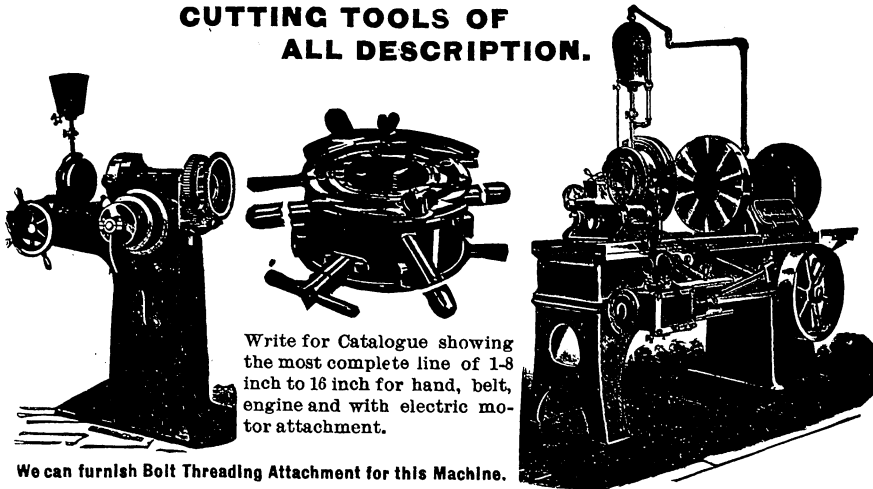
DRILL PRESSES
THE LARGEST
VARIETY
SEND FOR NEW
80 PAGE CATALOGUE
JUST OUT
DWIGHT SLATE
MACHINE CO.
HARTFORD, CONN.



OUR ADJUSTABLE STOCKS AND DIES are universally acknowledged to be the **BEST!** We also make all our Tools on the same principle of the **Best Material and Workmanship**, and always with a view of time and labor saving in their use.

JARECKI MFG. CO. (Limited), Erie, Pa.

PIPE THREADING AND
CUTTING TOOLS OF
ALL DESCRIPTION.



Write for Catalogue showing the most complete line of 1-8 inch to 16 inch for hand, belt, engine and with electric motor attachment.

We can furnish Bolt Threading Attachment for this Machine.

IF YOU WANT ANYTHING IN THE LINE OF
DROP PRESSES · DROP HAMMERS ·
STAMPS OR AUTOMATIC
DROP LIFTERS

SEND FOR CATALOGUE TO

Miner & Peck Mfg. Co.
 New Haven, Conn.
 LARGEST LINE IN THE MARKET.

Tinners'

Roofers'

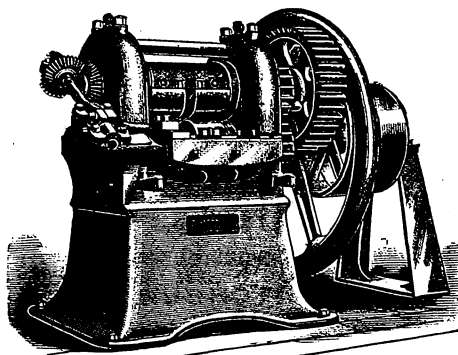
NIAGARA TOOLS.

Presses,

Shears,

Dies.

NIAGARA STAMPING AND TOOL CO., Buffalo, N. Y.



Taper Rolling Machine

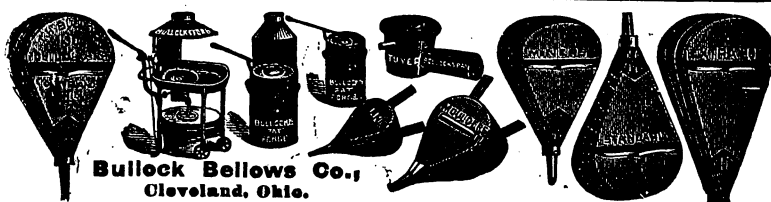
For tapering round or flat stock.
 For Elliptic Springs, Round Car
 Spring Points, Files and Agricultural
 Work.

MANUFACTURED BY

THE COULTER & McKENZIE
MACHINE CO.,

Bridgeport, - - Conn.

Also makers of Power Presses, Rivet
 Machines and fine Automatic Wire
 Working Tools.



Bullock Bellows Co.,
 Cleveland, Ohio.

Largest
Mfrs.
in the
World.

The Sigourney Tool Company,

HARTFORD, CONN., U. S. A.

INTERCHANGEABLE MACHINERY A SPECIALTY.

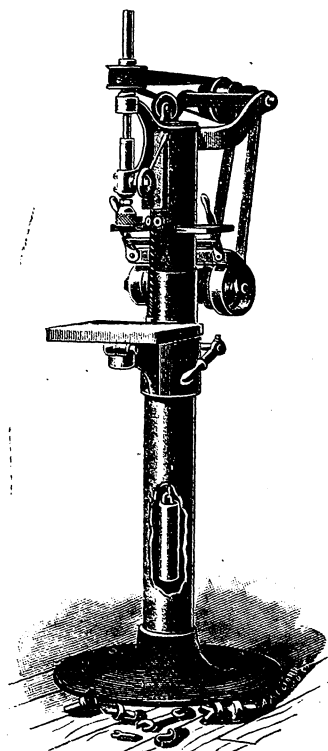
SPECIAL MACHINERY, AUTOMATIC GEAR CUTTERS, TYPE-WRITERS, BOOK SEWING MACHINERY, ELECTRICAL GOODS, MODELS, DIES, PUNCHES AND DRILL JIGS, BUILT BY THE DAY OR CONTRACT.

THE SIGOURNEY DRILLS

—: ARE :—

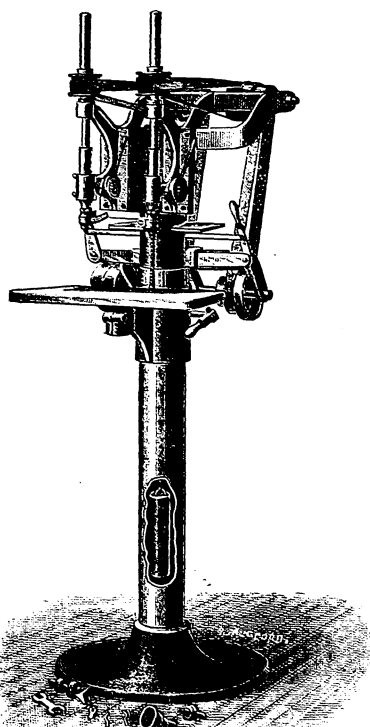
SENSITIVE, STRONG and INTERCHANGEABLE.

The downward throw of the spindles without readjustment of the tables is $2\frac{1}{4}$ inches. The tables have a vertical range of 30 inches and shafts can be centered to the length of 38 inches. The tables are also counterbalanced by weights inside of columns and can be turned to right or left, as required. On the studs of the lever pinions are clamp stops, that are instantly adjustable to determine the depth of holes to be drilled to the limit of the traverse of the spindles. On the side of the columns are planed lines and on the table brackets corresponding marks, which, when coincident, insure the exact agreement of the center of holes in table and of the spindles. The spindles are fitted to No. 1 Morse Drill Taper, and have three changes of speed. The spindles and their appurtenances are counterbalanced by open coiled springs concealed in cylindrical cases above the spindle pulleys.



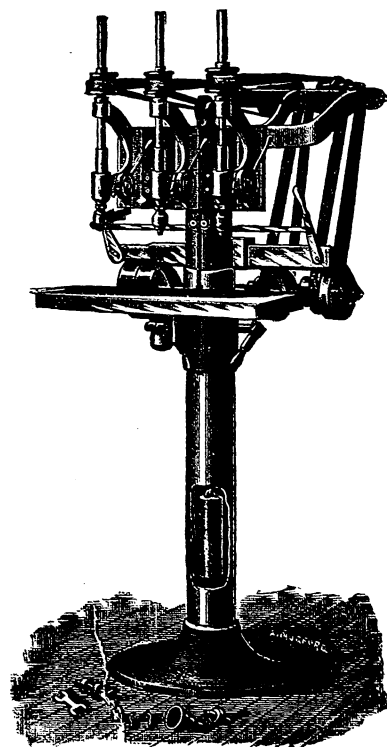
Single Spindle Drill.

Circular work, as pulleys or gears, can be admitted on this drill of a diameter of 12 inches, the spindle projecting more than 6 inches from the face of the column.



Two-Spindle Drill.

This machine, besides carrying two spindles, has a somewhat greater capacity than the single spindle drill, as it admits work of a diameter of $13\frac{1}{2}$ inches on the table.

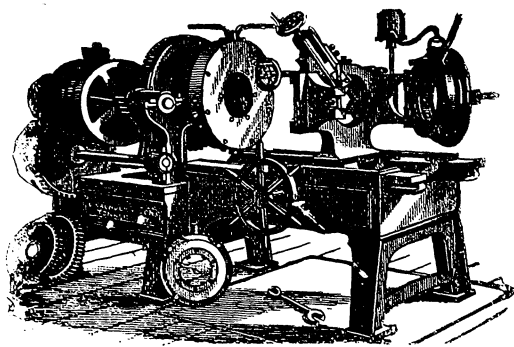


Three-Spindle Drill.

Center spindle admits work of a diameter of 12 inches.

Outer spindles admit work of a diameter of 17 inches.

The above drills furnished with longer throw to spindles; also to take larger diameter of work, when so ordered.



D. SAUNDERS' SONS,

—MANUFACTURERS OF—

Pipe Cutting and Threading Machines

For Pipe-Mill and Steam Fitters Use. Tapping Machines for Steam Fitting. Also Steam and Gas Fitters' Hand Tools.

—SEND FOR CIRCULARS.—

No. 25 Atherton Street, - YONKERS, N. Y.

Ferracute Machine Co.

BRIDGETON, N. J., U. S. A.,

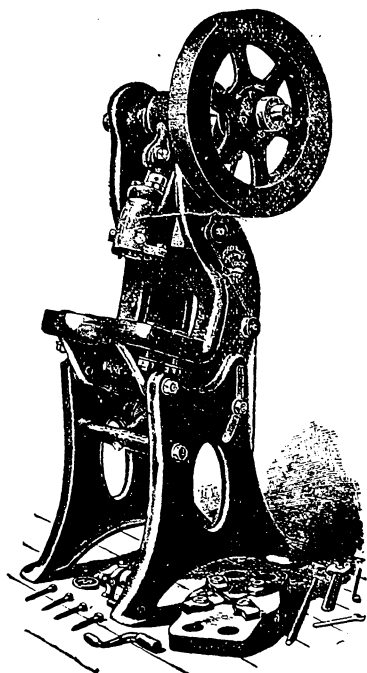
MANUFACTURERS OF

FOOT AND POWER

PRESSES, DIES,

AND ALL OTHER

Tools for Bar and Sheet Metals.



Send for Illustrated Catalogue containing sizes, weights and prices of one hundred kinds of Presses and other Tools for Brass Goods, Locks, Hardware, Nuts, Washers, Drop Forgings, Railroad, Bridge and other General Machine Shop Work, &c. Also for Tinware, Cans, Boxes, Lamps, Gas Fixtures and Silverware, &c., &c.

AMERICAN FOUNDRY PRACTICE

Treating of Loam, Dry Sand and Green Sand Molding, and containing a Practical Treatise upon the Management of Cupolas and the Melting of Iron. By THOMAS D. WEBB. Price, \$2.50. Sent, post-paid, on receipt of price by DAVID WILLIAMS, Publisher and Book-seller, 96-102 Reade St., New York.

THE ALLENTOWN ROLLING MILLS,

MANUFACTURERS OF

Pig Iron, Merchant Bar Iron, Rolled Shafting, Mine Rails, I-Beams, Tee Bars, Fish Plates, Bolts, Nuts and Spikes.

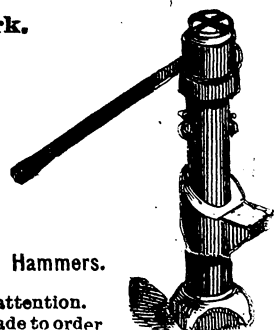
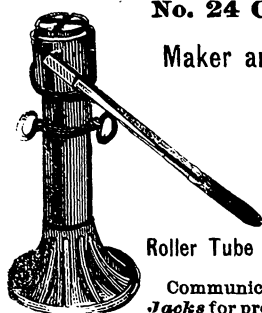
Transfer and Locomotive Turn Tables, Blast Furnace, Rolling Mill and Mining Machinery, Mining Pumps, Etc. Roll Trains, Shears, Punches, Iron Trucks, Etc. Builders of all classes of Machinery. Makers of Castings of all descriptions for Cable and Electric Railway. ALLENTOWN, PA.

RICHARD DUDGEON,

No. 24 Columbia Street, New York.

Maker and Patentee of the Improved

Hydraulic Jacks AND Punches.



Roller Tube Expanders and Direct-Acting Steam Hammers.

Communications by letter will receive prompt attention. Jacks for pressing on Car Wheels or Crank Pins made to order.

HYDRAULIC JACKS.

All sizes. All styles. All warranted.

HYDRAULIC PRESSES,

PUMPS, ACCUMULATORS, VALVES, GAUGES, FITTINGS, &c.

WATSON & STILLMAN, - 204-210 E. 43d St., New York.

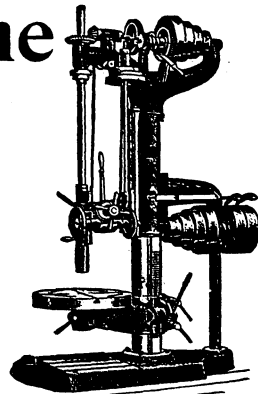
We Don't Blame

Those who buy machinery in these times, as even if interest, etc. is added to the investment, the purchase, all things being equal, is still a bargain, for prices on machinery are bound to advance sooner or later. For good machine tools address

THE HAMILTON MACHINE TOOL COMPANY,

WEST MARKET STREET,

Hamilton, - Ohio, U. S. A.



Jack Chain Machines.

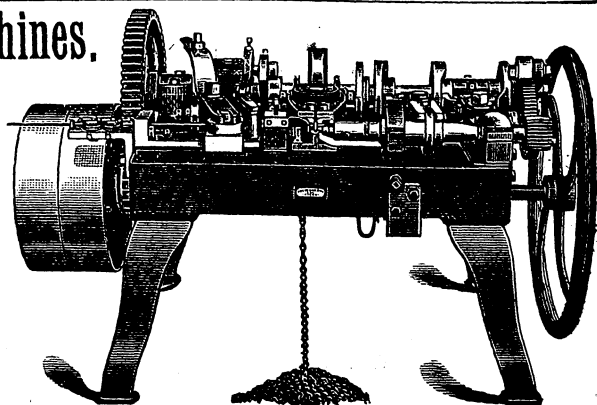
FOR BOTH DOUBLE AND SINGLE LINKS.

Entirely automatic, taking the wire directly from the coil and completing chain at the rate of 120 links per minute.

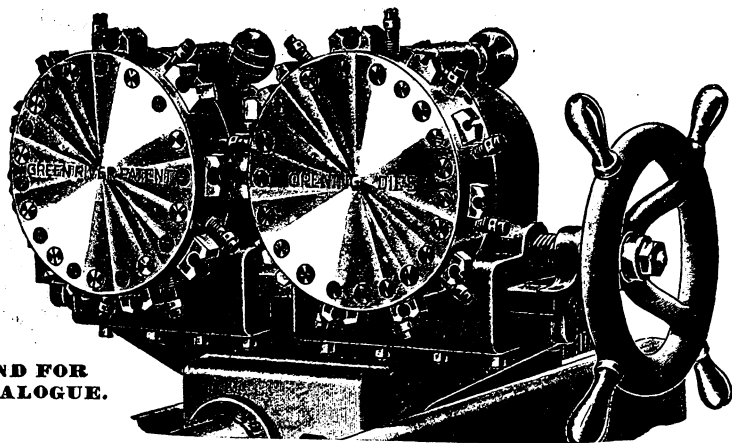
Send for prices.

CROSS & SPIERS MACHINE CO.,

Waterbury, Conn.



GREEN-RIVER BOLT CUTTERS WITH OPENING DIES.



SEND FOR
CATALOGUE.



WILEY & RUSSELL MFG. CO.,

Greenfield, Mass.. U. S. A.

Don't Buy

*Maule's "Skeleton" Pipe Die

If You Wish to Avoid

A Pipe-Threading Die extremely easy of operation by reason of the proper clearance of its cutters;

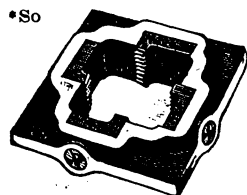
Of surpassing durability secured by the accurate and uniform temper of said Cutters;

Having Cutters that when dull may be removed in a moment, and sharpened on a grindstone or emery wheel;

Of phenomenal cheapness, arising from small first cost coupled to excellence of quality.

If by chance you do not think these points, or the saving of money, objectionable,

*So

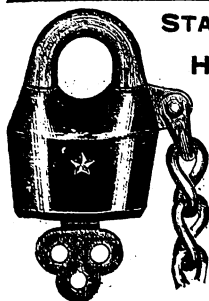


Send us a Postal Note for 62 Cents (do not send us any postage stamps), and we will mail you a sample one-inch Die, either $2\frac{3}{4}$ or $2\frac{1}{2} \times \frac{3}{4}$ thick, which we hereby agree to take back if not to your satisfaction.

HENRY B. PANCOAST & CO.,
PHILADELPHIA, U. S. A.

Send for Catalogue of the "Skeleton" Pipe Die.

Wire Drawing Machines, **WATERBURY**
Gang Slitters,
Power Presses and Dies, **MACHINE CO.,**
Tumbling Barrels, Waterbury, Conn.
Special Machinery. MANUFACTURERS.
Send For Prices.



STAR LOCK WORKS, PHILA.

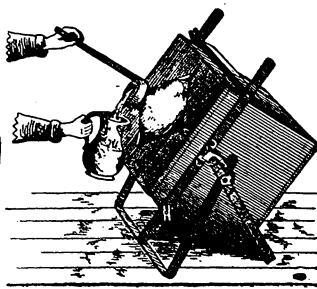
HILLEBRAND & WOLF,

MANUFACTURERS OF
1ST QUALITY ONLY
SCANDINAVIAN
AND
SPRING PADLOCKS

TRUNK & CASE LOCKS

CARBOY STANDS, &C.

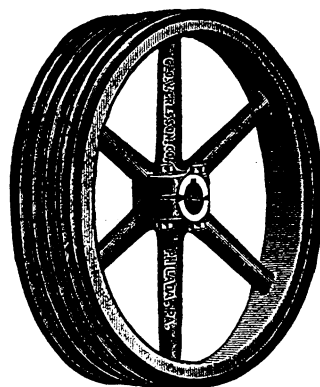
CATALOGUES SENT ON APPLICATION.



GEO. V. CRESSON CO.,

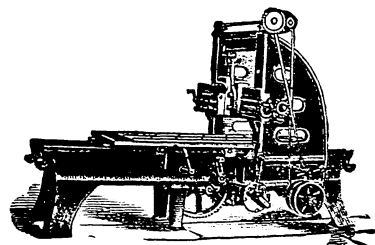
18th STREET AND ALLEGHENY AVE.

PHILADELPHIA, PA.



ROPE WHEELS,

All Diameters and Number of Grooves, for Manilla, Hemp, Cotton, or Leather Ropes.



NEW HAVEN MANUFACTURING CO.

NEW HAVEN, CONN.,

Manufacturers of

IRON-WORKING MACHINERY

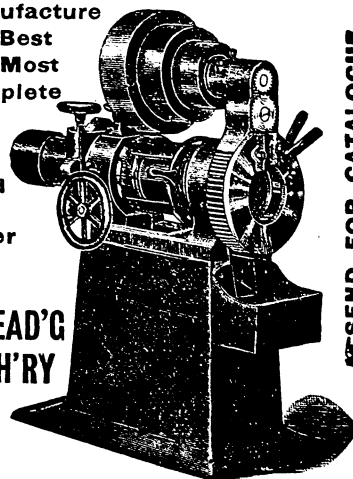
The Merrill Manufacturing Co.,

TOLEDO, O.

Manufacture
The Best
and Most
Complete
Line
of

Hand
and
Power

PIPE
THREADING
MACH'RY
IN
USE.



SEND FOR CATALOGUE

Pumps and Pumping Machinery. Part 1. By FREDERICK COLVER, M. Institute C. E. Second edition, revised and enlarged. Synopsis of contents: Lift Pumps.—Driving gear. Beer, tar, vinegar, sewage and well pumps, &c. Force pumps, various kinds. General details of lift and force pumps. Arrangement of engine and pumps. Depth of suction, water towers, &c. Sundry pumps.—Centrifugal, drainage and dock pumps, chain pumps, air pumps, blowing engines and compressors. Engines for working pumps. Horizontal high-pressure engines. Compound engines. Vertical engines. Quadruple-expansion engines. Data of working results, &c., &c. Cornish engines. Beam and bull engines. Fuel consumed. Boilers, vertical, cylindrical, Cornish, Lancashire, multitubular, patent water tube boilers, &c. Engine houses, details of construction, fittings for rooms, &c. Boiler houses. Index. 200 pages. 63 large folding plates to scale. Cloth. 8vo. \$10.00

For sale by David Williams, 96-102 Read St. N. Y.

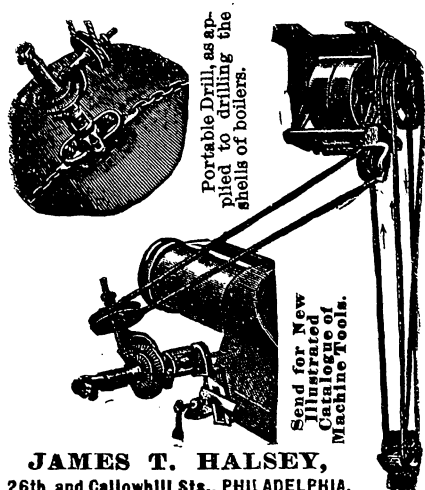
FRICITION CLUTCHES, SHAFTING, HANGERS, PULLEYS.

Sheaves for Rope Driving.
Gear Wheels.

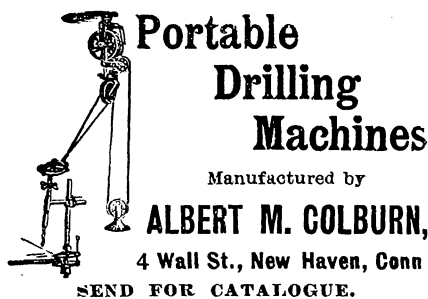
FRICITION PULLEYS.

KEYSTONE CLUTCH AND MACHINE WORKS,

1708-1710 Germantown Ave.,
PHILADELPHIA, PA.



JAMES T. HALSEY,
26th and Callowhill Sts., PHILADELPHIA.

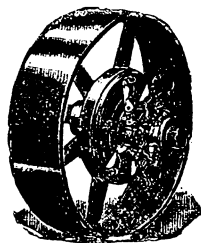


REECE'S PATENT HAND BOLT CUTTER OR SCREW PLATE.



Send for new catalogue of
SCREW CUTTING TOOLS.
EDWARD F. REECE, Mnfr., GREENFIELD, MASS

The Moore & White Co.,



N. E. Cor. 15th AND LEHIGH AVE.,
PHILADELPHIA, PA.

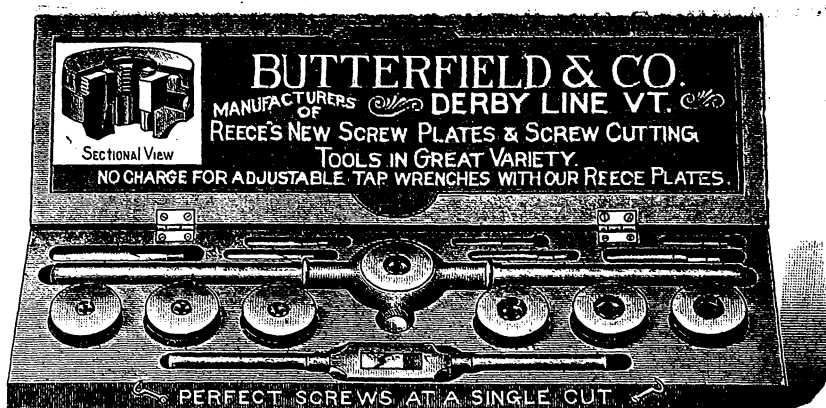
Paper
Machinery,
Friction
Clutches, &c

Salem Foundry and Machine Shop

BUILDERS OF

ELEVATORS

SALEM, MASS.



'CUSHMAN' CHUCKS.

We manufacture and keep in stock a full line of chucks for all purposes

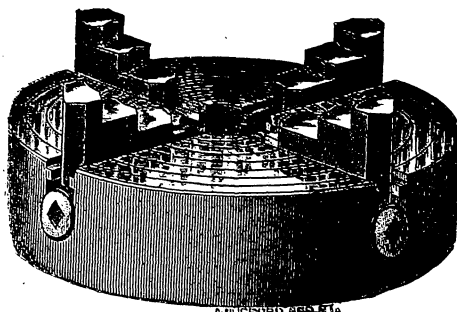
Independent 4 Jaw Chucks from 4 to 26 Inch.
Patent 4 Jaw Lathe Chucks from 4 to 26 Inch.
Reversible Face-Plate Jaws for Use on Lathes from 30 to 72 Inch
Two-Jaw Chucks, Round and Box Body, from 4 1/2 to 18 Inch.
Universal Chucks from 2 to 21 Inch, in several styles.
Combination Chucks from 4 to 24 Inch.
Drill Chucks, four styles.
Centering Chucks.
Special Chucks for Cutting-off Machines. A full line and some new improvements.

We also make a great variety of special Chucks for holding bicycle parts, valves, fittings and other special shaped pieces.

A 44-Page Catalogue Sent on Application.

THE CUSHMAN CHUCK CO., Hartford, Conn.

CHAMPION INDEPENDENT CHUCKS.

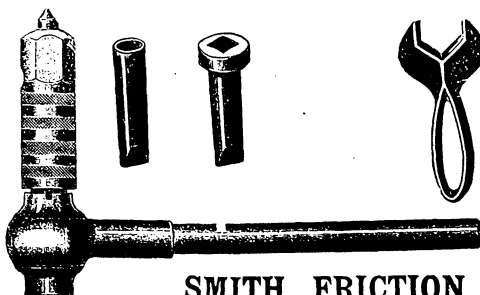


An entirely new line of small Chucks, provided with 3 or 4 independent reversible steel jaws. The best Chuck in the market for foot lathes. Ask your dealer for them or write to us.

THE D. E. WHITON MACHINE CO.
New London, Conn.

Tele European Agents SELIG SONNENTHAL & CO., London.

Instantaneous Clutch.



No Lost Motion,

COMBINATION Friction Drill-Stock.

— FOR —
TWIST AND FLAT
DRILLS.

SEND FOR CATALOGUE.

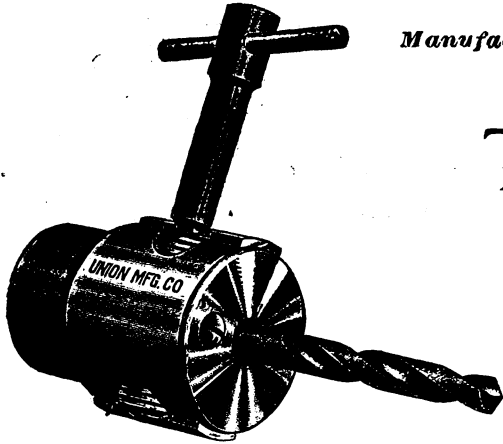
SMITH FRICTION DRILL AND TOOL CO.,
BOSTON, MASS.



Three styles of Screw Plates **BUILT ENTIRELY ON HONOR**, with prices to suit all.
Write for catalogue.

CHAMPION BLOWER & FORGE CO., - - - **LANCASTER, PA.**

UNION MANUFACTURING COMPANY, .'. NEW BRITAIN, CONN
WAREHOUSE, 103 CHAMBERS ST., NEW YORK.

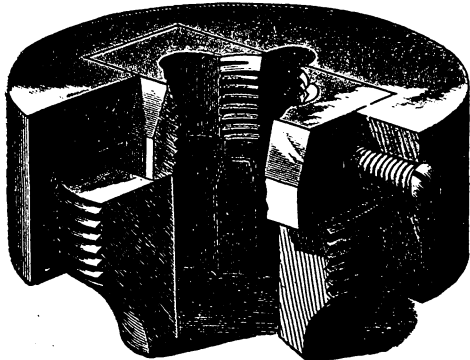


Manufacturers of Combination, Universal, Independent, and Combination Reversible Jaw Chucks.

THE UNION DRILL CHUCK.

NUMBER.	DIAMETER.	HOLDING.	LIST.
000	1 1/2 inches.	0 to 1/2 inch.	\$7.00
100	2 1/2 "	0 to 1/2 inch.	8.00
101	2 3/4 "	0 to 3/4 inch.	9.00
102	3 1/2 "	0 to 1 inch.	10.00

"LITTLE GIANT."



Patented February 3d, 1885.

SECTIONAL VIEW OF DIE AND COLLET.

ADJUSTABLE DIE AND COLLET.

To adjust simply turn screws at end of dies *in or out*, as the adjustment desired requires.

SIMPLE, STRONG AND DURABLE.

SOMETHING FOR NOTHING.



In every assortment of our **NEW LITTLE GIANT SCREW PLATES** we put in our latest improvement in adjustable **TAP WRENCHES** at no extra expense to purchaser.

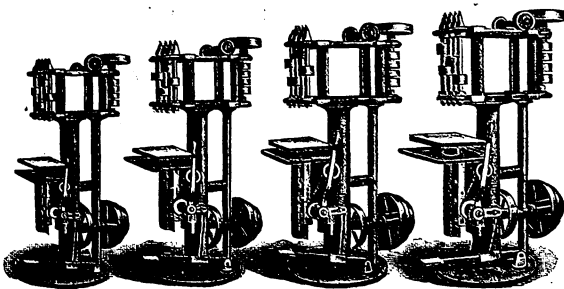
TWO AND A HALF DOLLARS' WORTH OF TOOLS FOR NOTHING



MANUFACTURED BY WELLS BROS & CO., GREENFIELD MASS.
 Send for latest illustrated Catalogue of Screw Cutting Tools.

Ask your dealer for
 New Little Giant Screw Plate with
 Tap Wrench.
 Same list prices as heretofore.

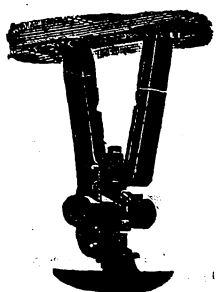
PRATT & WHITNEY CO., Hartford, Conn., U. S. A.



Manufacture Gang Drills of improved design, with two, three, four and six spindles, in four sizes. The spindles are made of tool steel, have steel boxes hardened and ground, with provision for adjustment for wear. Tables are counterbalanced.

Drilling Machines of many styles in Stock.

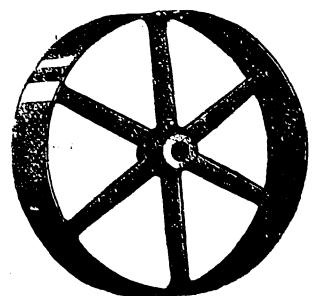
ASK FOR "HARDWARE" CATALOGUE.



It's Money

in your pocket when you buy Foley's Pulleys, Hangers, Journal Boxes, Wall Brackets, etc. Try them. See if it isn't so.

J.W. FOLEY & CO., 329-337 W. Front Street, Cincinnati, O.



THE STANDARD TOOL CO., CLEVELAND, OHIO.

MANUFACTURERS OF

Increase Twist Drills, Reamers, Taps, Milling Cutters and Chucks.

Taper Shank
Drills,
St. Shank Drills,
Screw-driver
Bits,
Reamers,
Shell and Solid
Taper Reamers.



Bit Stock Drills for Metal or Wood.



Wood-Boring Brace Drills, will cut off nails.

Hand Taps,
Mach. Screw Taps
"Standard" Drill
Chuck,
"Ellenwood" Drill
Chuck,
Sq. Shank Drills
for Ratchets,
Twist Drills for
Blacksmiths'
Presses

Sockets for
Taper Shank
Drills.Reamers in
all sizes.

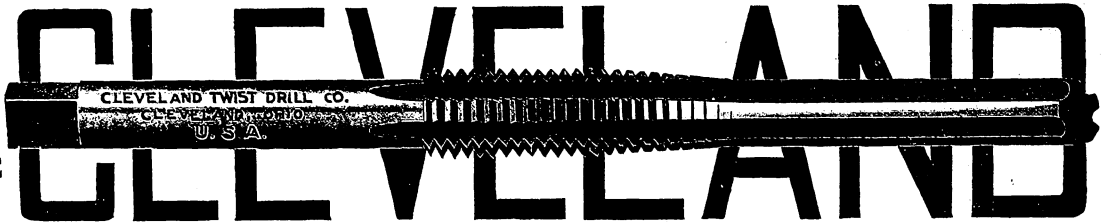
NEW YORK OFFICE, 33 CHAMBERS ST. Send for Catalogue.

1874

OLD RELIABLE.

1898

SEND
FOR
CATALOGUE



WRITE
FOR
DISCOUNTS

Our Drills are Hot Forged. The best part of the steel IS NOT CUT OUT and thrown away



They are TOUGHER, STRONGER, BETTER than is possible to attain by milling. Catalogue and Discounts sent on application.

STOW FLEXIBLE SHAFT, Morse Twist Drill & Machine Co., NEW BEDFORD, MASS

Invented and
Manufactured by
THE

STOW MFG. CO.,

Established 1875. Binghamton,
N. Y.

PORTABLE.
DRILLING
TAPPING.
REAMING.

General European Agents,

SELIG SONNENTHAL & CO.,

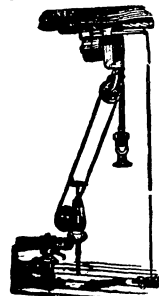
55 Queen Victoria St., LONDON, ENGLAND.



Thos. H. Dallett & Co.

York St. and Sedgley Ave.,
PHILA.

MANUFACTURERS OF
Portable Drills, Hand
Drills, Boiler Shell Drills
Electric Motors specially
adapted for driving Ma-
chine Tools, Cranes, Ele-
vators, Pumps, Presses and
other machinery.

Complete Power and Light
Plants Installed.

Stow Flexible Shaft Co., Limited,

26th, Callowhill & Biddle Sts.
PHILA., PA.,

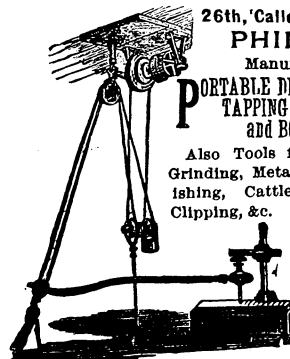
Manufacturers of

PORTABLE DRILLING,
TAPPING, REAMING
and BORING MACHINES

Also Tools for Emery Wheel
Grinding, Metal and Wood Pol-
ishing, Cattle Brushing and
Clipping, &c.

Gen'l European
Agents.

Bolling & Lowe,
2 Lawrence,
Pountney Hill.
LONDON, ENG.



Manufacturers of Morse Pat. Straight-Lip Increase Twist Drills,



Bit Stock Drills, Solid and Shell Reamers, Drill Grinding Machines,

Milling



Cutters,

Beach's Patent Self-Centering Chucks, and Special Tools to Order.



ALL TOOLS EXACT TO WHITWORTH STANDARD GAUGES.

MANNING, MAXWELL & MOORE,

Sole Sales Agents for THE MORSE TWIST DRILL AND MACHINE CO.'S



Manufacture of Patent Machine Relieved Nut, Hand,
Blacksmith and Machine Screw Taps, Screw Plates, Tap
Wrenches and Patent Relieved Pipe Taps and
Pipe Reamers; also of Solid Bolt and Pipe
Dies. Furnished in V. U. S. Standard and
Whitworth shape of threads.



111 Liberty Street,

NEW YORK.



FOR PIPE.

THE ADJUSTABLE
"DUPLX" DIE STOCK.

Quick. Accurate. Durable.

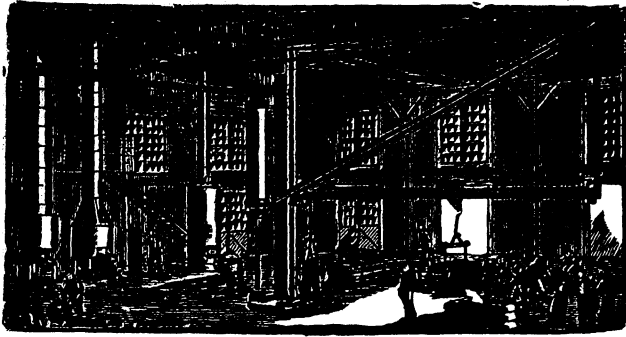
15,000 now in use.

HART MANUFACTURING CO.,

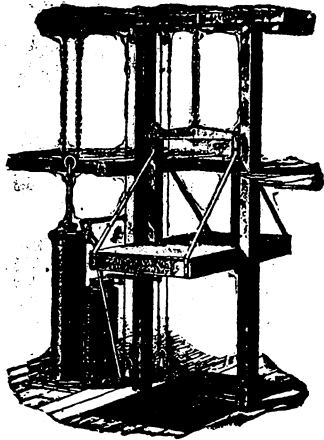
CLEVELAND, O., U. S. A.



FOR BOLTS.



5-ton Ridgway Crane in Foundry Diamond State Iron Co., Wilmington, Del.



Steam-Hydraulic Elevator.

is the Crane for all places.

Give full particulars and get circulars and prices.

**SAFE,
RAPID,
SURE**
— AND —
Not Costly.

The Crane that is perfection for the exacting requirements of a Foundry

CRAIG RIDGWAY & SON,
Coatesville, Pa.

Ridgway Balanced Steam-Hydraulic Crane.

The Greatest Foundry Crane Known.

Are you noting the letters printed here from week to week?

Simply Great! Aren't They?

Here's one from the Newest and Largest Foundry in the State of Indiana.

When that **BOOM** sets in and you must get Cranes you'll know which to get.

GAAR, SCOTT & CO.
Engines, &c.

RICHMOND, IND., April 12th, 1893.

MESSRS. CRAIG RIDGWAY & SON,
Coatesville, Pa.

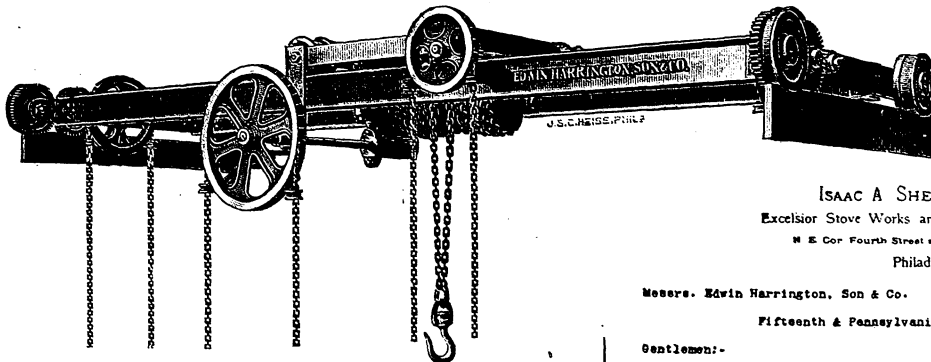
Dear Sirs:—We have five of your Cranes in use in our new foundry. We find them capable for the heaviest lifting and equally adapted for nicety of performance when drawing a pattern from the flask and in all similar operations. They are convenient and do not take severe effort on the part of anybody to accomplish a great variety of useful results which we secure every day from their use. We do not hesitate to recommend them very highly and we do not see anything to hinder a valuable future for them and consequent advantage to yourself. We are very glad to add our testimony in this manner to the genuineness of all you claim for the Ridgway Balanced Crane and recommend it to public favor.

Very truly,

GAAR, SCOTT & CO.

A New Foundry Crane.

A Veritable "SAFETY" Traveling Crane.



This SAFETY Crane was designed by us in answer to a demand for a SMOOTH RUNNING Crane.

No Jumping of Chains. No Jarring of Load.

No Loss of Sand. No "Breaking Down of Mould."

Read accompanying letter of well known house of Isaac A. Sheppard & Co.

EDWIN HARRINGTON, SON & CO., Inc.,
Machine Tools, Double Chain Screw Hoists, Special Machinery.

ESTABLISHED 1867.

Send for Photographs and Prices.

1508 Pennsylvania Ave., Philadelphia, Pa.

ISAAC A. SHEPPARD & CO.

Excelsior Stove Works and Hollow Ware Foundry.

W E Cor Fourth Street and Montgomery Avenue.

Philadelphia, September 16, 1893.

Messrs. Edwin Harrington, Son & Co.

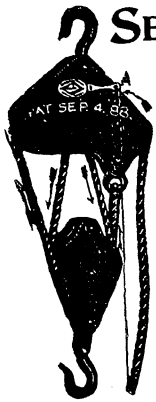
Fifteenth & Pennsylvania Ave. Philada.

Gentlemen:—

In reply to your inquiry of the 14th. inst., we would say that we are greatly pleased with the special foundry crane which you recently erected in our foundry. It is, in every way, perfectly adapted to the use for which it was intended, and lifts a mould absolutely without jar, so that we have not had the least trouble with the breaking down of a mould at the critical point. For a light foundry crane, we hardly see how it can be improved upon.

Very truly yours,

Isaac A. Sheppard & Co.



SELL THE BEST.

**THE "SURE GRIP"
Steel Tackle Block**

is taking the place of all other hoisting blocks.

Send for catalogue and discount.

Fulton Iron & Engine Works,
28 Brush St., Detroit, Mich.

ESTABLISHED 1852.



Highest Efficiency.

**WESTON'S NEW
TRIPLEX
Chain Block**

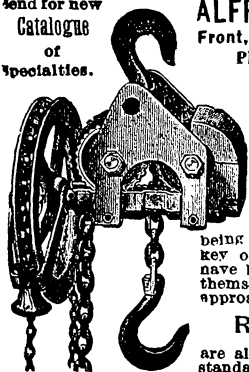
far exceeds all predecessors. Send for Prof. Thurston's report of comparative tests of all chain pulley blocks.

The Yale & Towne Mfg. Co.

STAMFORD, CONN.

New York, 84-86 Chambers St.
Chicago, 162-164 Wabash Ave.
Philadelphia, 1120 Market St.
Boston, 224 Franklin St.

Send for new
Catalogue
of
specialties.



ALFRED BOX CO
Front, Poplar and Canal Sts.
Philadelphia, Pa.

Manufacturers of
Box's Pat. Double

Screw Hoists
13,000 in use.

Many have done hard continuous duty years without a single part being renewed. This is the key of our success. They have built up a reputation themselves that cannot be approached. Our improved

Radial Drills

are also assuming the same standard.



Moore Mfg. & Fdry. Co.,

Milwaukee, Wis., U. S. A.,

Manufacturers of

Moore's Anti-Friction

Differential

Chain

Pulley

Block.

A New Movement!
A Perpetual Com-
pound Lever!

Powerful, Simple and
Durable!

One Man Can Lift to
the Full Capacity of the
Block.

Self-Sustaining at Any
Point.

The Block Always
Hangs Plumb.

Send for descriptive price-list,
mentioning this paper.

DUNHAM NUT MACHINE CO.,

Unionville, Conn.,

Manufacturers of

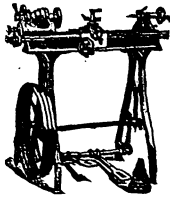
AUTOMATIC COLD PRESS NUT MACHINES

FOR MAKING CHAMFERED AND TRIMMED NUTS.

Correspondence Solicited.

LATHES.

ISRAEL H. JOHNSON, JR., & CO., - PHILADELPHIA.



Foot & Hand Power Machinery.

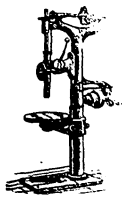
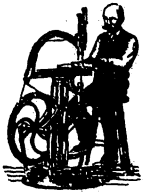
Screw Cutting Lathes, Wood Turning Lathes, Scroll Saws,
Circular Saws, Moulders, Mortisers, Etc.

Strictly High Grade.

Catalogue Free.

SENECA FALLS MFG. CO.,
255 Water St., Seneca Falls, N. Y., U. S. A.

London Agency, MESSRS. CHAS. CHURCHILL & Co., 21 Cross St.,
Finsbury, London, E. C., England.



**MULTIPLE,
UPRIGHT, UNIVERSAL,
AND RADIAL
BORING AND TURNING MILLS.**

BICKFORD DRILL AND TOOL CO.,
10 Lawrence St., Cincinnati, O.

DRILLS

COPELAND & BACON
HOISTING & WINDING ENGINES

ORE (RUSHERS),
ORE WASHERS,
CONCENTRATING
MACHINERY,
GRAVITY INCLINES,
STONE (RUSHERS),
RAILROAD CRANES.

85 LIBERTY ST. NEW YORK. 62 SO. CANAL ST. CHICAGO.

SECOND-HAND MACHINE TOOLS

Nearly as Good as New.

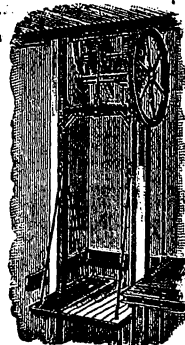
6 ENGINE LATHES,
2 IRON PLANERS,
4 DRILL PRESSES,
1 GEAR CUTTER,
1 MILLING MACHINE.

A rare chance to buy a few Harrington
Tools at a very low figure.

On account of extensive improvements, and to make room for new tools, we offer
this list at a Great Reduction. SEND for full description.

EDWIN HARRINGTON, SON & CO., Incorp'ted,
1508 Pennsylvania Ave., Philadelphia, Pa.

ELEVATORS



PATENTED

**HAND AND BELT
POWER**

**"VARIETY"
Hand Elevator**

HAS

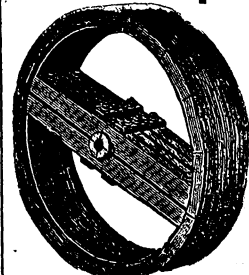
Automatic Clutch,
Roller Bearings,
Machinery fastened to-
gether in Iron Frame.

Prices on any ma-
chine furnished on ap-
plication to

Variety Machine Co

Warsaw, N. Y.

Wood Split Pulley.

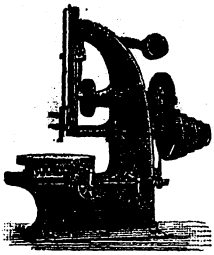


**Strongest,
Lightest,
Simplest,
Cheapest**

Wood split pulley
in the world. Satis-
faction guaranteed.
Write for price-list
and descriptive
Catalogue. Ad-
dress

REEVES PULLEY CO.,

1220 E. 7th Street, - COLUMBUS, IND.
New York Agents,
Patterson, Gottfried & Hunter, 144-150 Centre St.

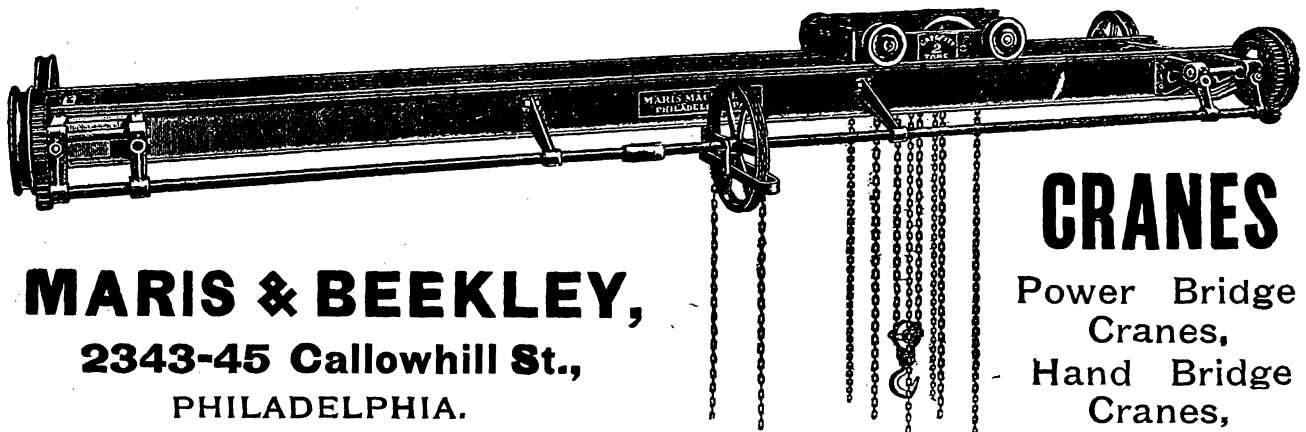
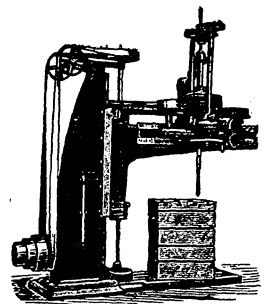


William Sellers & Co. Incorp.

PHILADELPHIA, PA.,

—MANUFACTURERS OF—

Improved Machine Tools for Working Iron and Steel,
High Speed Power Traveling and Swing Cranes,
Injectors, Locomotive Turn Tables, Shafting, &c., &c.
Testing Machines, under patents of A. H. Emery.
Prices, Descriptive Matter, &c., Furnished on Application.



MARIS & BEEKLEY,
2343-45 Callowhill St.,
PHILADELPHIA.

World's Fair, Machinery Hall, Section 26, Column 0-30.

CRANES

Power Bridge
Cranes,
Hand Bridge
Cranes,
Jib Cranes.

**MORSE,
WILLIAMS
& CO.**

Morse Elevator Works.

MANUFACTURERS AND BUILDERS OF
ELECTRIC, HYDRAULIC, BELT and HAND
POWER PASSENGER and FREIGHT
ELEVATORS.

1105 Frankford Ave., Philadelphia. 108 Liberty St., New York.
1116 E. St., N. W., Washington, D.C. 33 Lincoln St., Boston.
425 Spruce St., Scranton, Pa. 82 Church St., New Haven
Omaha Building, Chicago, Ill.



J. G. SPEIDEL,
807 & 809 CHERRY STREET,
READING, PA.
Patentee and Manufacturer of the
celebrated

Economic Safety Hoist.

500 to 30,000 Lbs. Capacity.
Has been awarded the John Scott
Medal and Premium by the Franklin
Institute of the City of Philadelphia
for Highest Efficiency, Simp-
licity and Durability.
One man can lift two to three times
as fast as with any other self-holding
chain hoist. It has two speeds, is
built strong and durable, and guaran-
teed to give satisfaction.

TRAVELING AND SWING CRANES up
to 30,000 lbs. capacity and 50 ft. span.
Overhead Tramway, with Trolleys,
Switches, &c. Elevators and
Special Hoisting Machinery.
Illustrated Cat. and Prices on
application.

FAIRMOUNT MACHINE CO.,

(Successors to Thomas Wood & Co.)

Twenty-second and Wood Sts., Philadelphia, Pa.

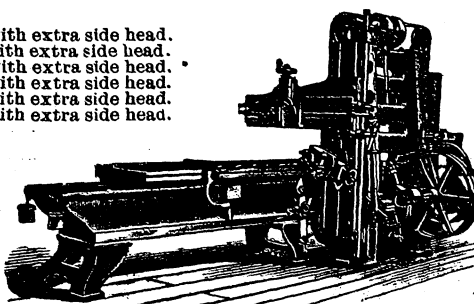
Shafting, Gearing, Self-Oiling Bearings, Friction Pul-
leys, Elevators.

Rope Transmission; Sheave Wheels, any size required, for Hemp, Manila and Cot-
ton Rope Driving. Looms, Cotton and Woolen Machinery for Winding,
Spooling, Reeling, Beaming, Warping, Dyeing, Sizing, Scouring &c.

= = OPEN-SIDE PLANERS. = =

READY FOR IMMEDIATE AND PROMPT DELIVERY.

Size C (30 in. x 30 in.), to plane 6 feet long.
Size C (30 in. x 30 in.), to plane 8 feet long with extra side head.
Size C (30 in. x 30 in.), to plane 12 feet long with extra side head.
Size D (36 in. x 36 in.), to plane 10 feet long with extra side head.
Size D (36 in. x 36 in.), to plane 12 feet long with extra side head.
Size F (48 in. x 48 in.), to plane 14 feet long with extra side head.
Size F (48 in. x 48 in.), to plane 16 feet long with extra side head.



**DETRICK & HARVEY
MACHINE CO.,**
MANUFACTURERS,
BALTIMORE, - - MD

MATCH Machinery.

Paper Box Machinery.

Send for Catalogue.

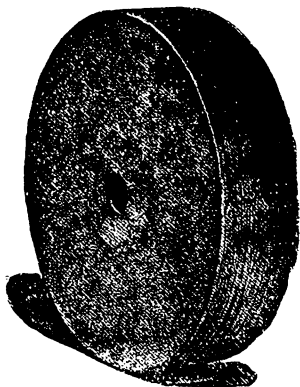
HERRICK & COWELL,
36 ARTIZAN ST.,
NEW HAVEN, - CONN.

NORTON EMERY WHEEL COMPANY.

Illustrated CATALOGUE free upon application.

Over **100,000** Wheels in Stock
WORCESTER, MASS.

Solid Leather Wheels
FOR POLISHING.



Will outwear any other wheel.
Saves the continual expense of
recovering. Pliable and elastic.
Waterproof and will not burst.

C. E. LE MASSENA & CO.,
776 Broad Street, NEWARK, N. J.

GEORGE E. BELL,
Successor to E. M. HYDE and UNION STONE CO.,
—SOLE AGENT—

Waltham Emery Wheels,
WALPOLE MILLS TURKISH EMERY.
Dealer in Platers' and Polishers' Machinery and
Supplies of all kinds. Foundry Supplies.
36 JOHN ST., NEW YORK.

Sterling Emery Wheel Company, 174 Fulton St., N. Y.
FACTORIES:
Tiffin, Ohio, and West Sterling, Mass.



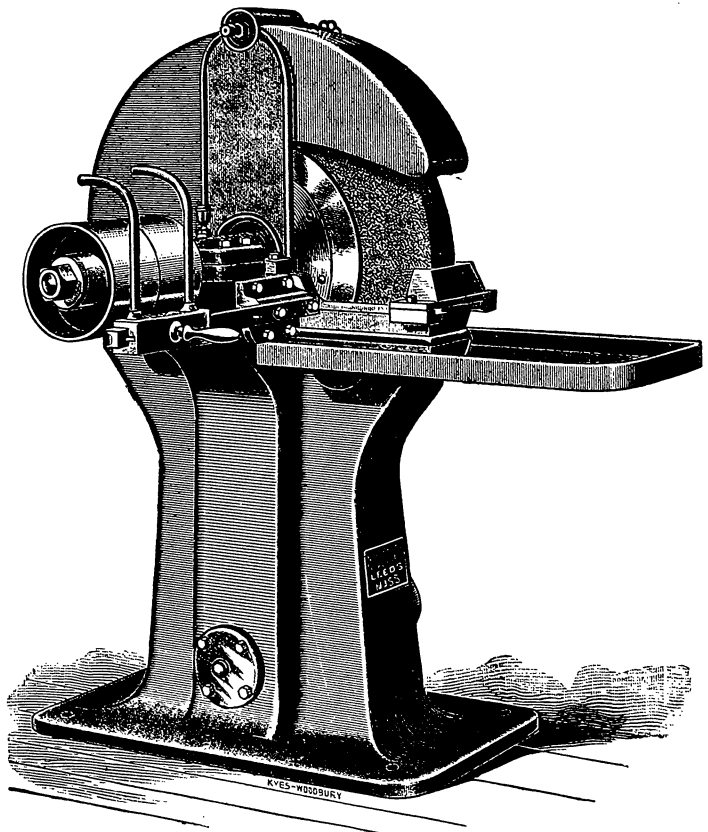
ESTABLISHED 1887.

CAPITAL \$100,000.

Northampton Emery Wheel Co.,

Leeds, Mass., and 20 So. Canal Street, Chicago,

Manufacturers of



WATER TOOL GRINDER.

Emery Wheels and Emery Wheel Machinery

OF BEST QUALITY.

Send for Catalogue.

FACTORY AT LEEDS, MASS.

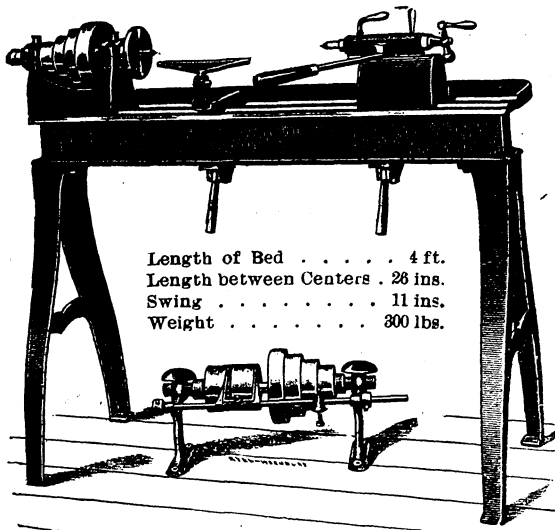
IT'S
TO **Your Advantage**

to correspond with
us regarding emery
wheels.

Grant Corundum Wheel Mfg. Co.
WORCESTER, MASS.

BOOKS

{ THE NEWEST BOOKS ON Meta. Working, Iron, Steel and
Metallurgy; Mining, Mechanical and Civil Engineering; Casting and
Founding; Electricity and Electric Lighting; Draftsmanship,
Architecture and Building, promptly supplied on receipt of price.
SEND FOR CATALOGUES, mentioning the kind of books
you are looking for.
DAVID WILLIAMS, 96-102 Reade St., New York.



TO REDUCE OUR STOCK

We are offering for the next 60 DAYS

This \$60 Lathe for \$45.

HAS HOLLOW SPINDLE.

HAS BOTH SCREW AND LEVER FEED
FOR TAIL SPINDLE.

A THOROUGHLY WELL MADE TOOL.

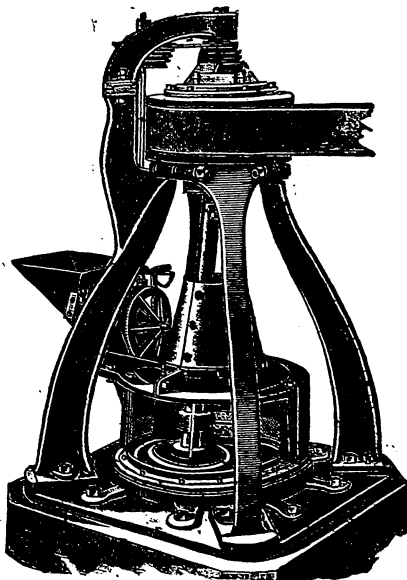
—MANUFACTURED BY—

WELLS BROS. & CO., GREENFIELD, MASS.

THE GRIFFIN MILL

The Only Perfect Pulverizer

OF
QUARTZ,
GOLD
OR SILVER
ORES,
PLUMBAGO,
PORTLAND
CEMENT,



OF
PHOSPHATE
ROCK,
FOUNDRY
FACINGS,
And All Other
Refractory
Substances.

Will work either wet or dry, and deliver a finished product. Capacity, 3 to 4 tons per hour on Phosphate Rock, $1\frac{1}{2}$ to 2 tons per hour on Portland Cement, Quartz or Ores, depending on hardness of material to be pulverized and fineness of product. Grinds from 30 to 250 Mesh with equal facility.

NO JOURNALS IN GRINDING CHAMBER. BALL RIGID ON SHAFT HAVING DIRECT POSITIVE ACTION ON MATERIAL. MINIMUM POWER PRODUCES MAXIMUM AMOUNT OF PRODUCT. IT IS ABSOLUTELY GUARANTEED IN EVERY RESPECT, BOTH AS TO CONSTRUCTION AND CAPACITY. FIRST COST, WEAR, AND OPERATING EXPENSE MUCH LESS THAN STAMP MILLS. LARGE NUMBER OF MILLS IN USE ON DIFFERENT MATERIALS WITH POSITIVE SUCCESS IN EVERY INSTANCE.

Correspondence solicited, and illustrated descriptive pamphlet furnished on application to

BRADLEY FERTILIZER CO., 92 State St., Boston, Mass.

A POOR OIL STONE IS WORTHLESS.



PIKE'S

Lily White Washita is
Warranted to give
satisfaction.

THE PIKE MFG. CO., PIKE STATION, N. H.

A POINTER

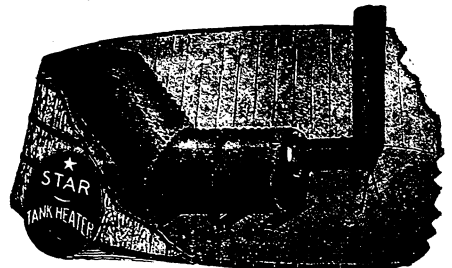


To **SAVE** you **FREIGHT**. We keep in stock everything in the grindstone line at our branch yards, Chicago, Ill., Boston, Mass., and 283 Front Street, New York.

Send for Catalogue D.

The Cleveland Stone Co., CLEVELAND, OHIO.

"STAR" TANK HEATER.



Made from **HEAVY BOILER STEEL**. Can be used in any tank and moved around at will. For **Special Prices and Circulars** Address: **HUNT, HELM & FERRIS, Sole Manufacturers, HARVARD, ILL.**

FOR

Substantial, Well Made,
Low Priced, Patented

20 Inch Drills

with latest improvements.
Lever, Combination or Wheel
Feed, address

Sibley & Ware,
South Bend, Indiana.



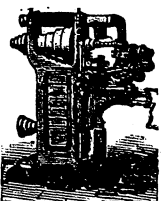
THE ROBERT W. HUNT & CO.

Bureau of Inspection, Tests and Consultation.

Rails, Splices and Cars. Analytical and Physical
Laboratories. Examination of Iron and Steel Works
and advice on Processes.

General Office: The Rookery, Chicago. Branch
Offices: Hamilton Building, Pittsburgh; 28 Chestnut
St., Philadelphia; 80 Broadway New York.

Standard

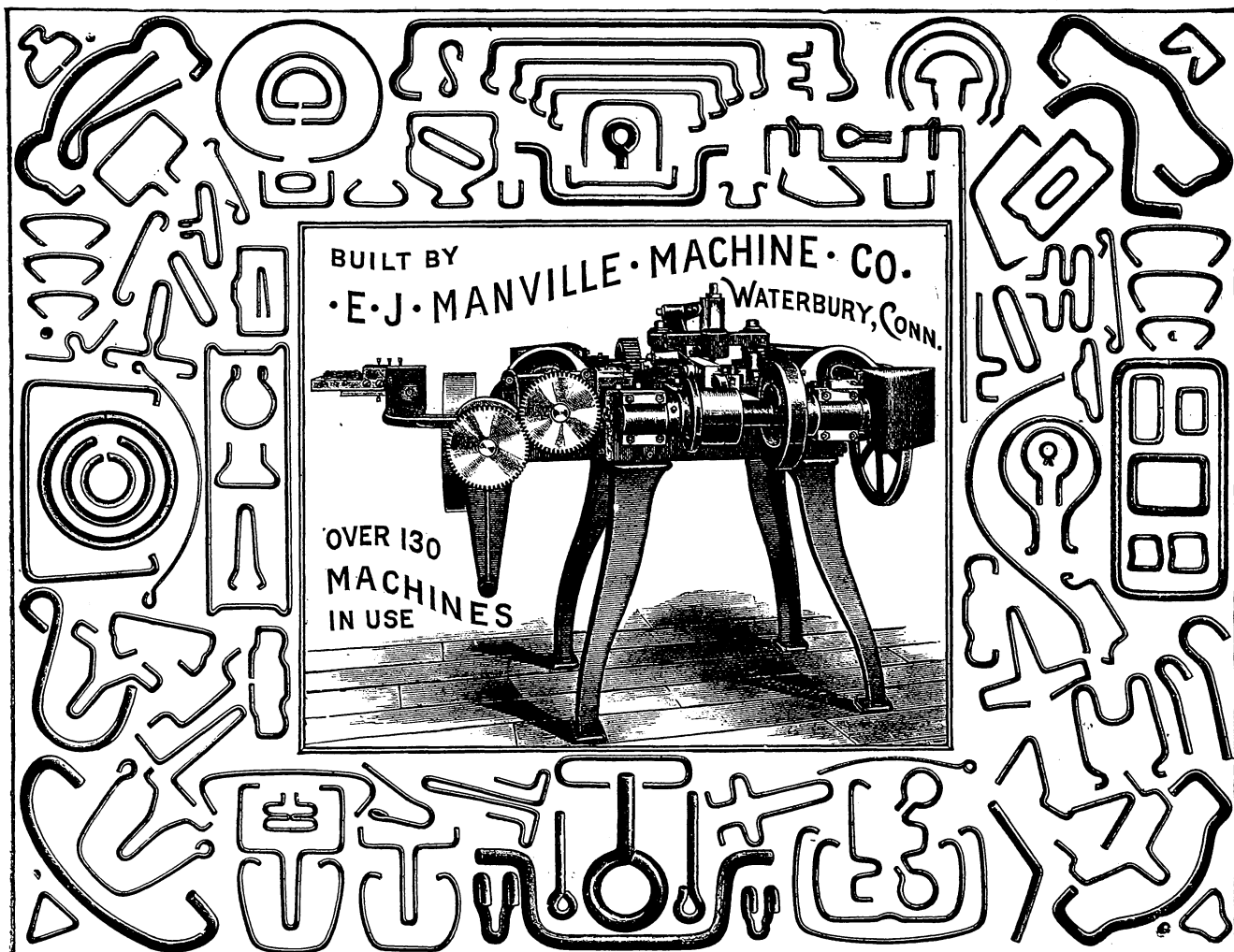


is the milling machine made by us. Why? Because it is speedier in every respect and produces better work than any other. If you don't know much about "Milling Machines" write for pamphlet

The Cincinnati Milling Machine Co.,

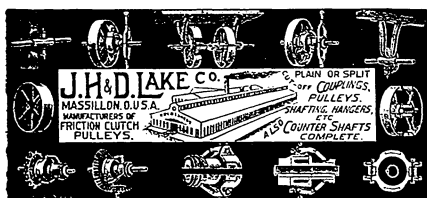
CINCINNATI, OHIO.

E



BUILT BY
E. J. MANVILLE MACHINE CO.
WATERBURY, CONN.

OVER 130
MACHINES
IN USE



The Scattergood
Time Record and
Pay Roll Book.
(Pat. Oct. 13, 1891.)
Address for Circular to
HENRY W. SCATTERGOOD,
23 Richmond St. Phila., Pa.

YOU Can Tin Cast Iron as readily and cheap as Malleable Iron.

The Flanders process for tinning cast iron is now an assured success and is in use by some of the largest firms in the country. Correspondence solicited for the erection of galvanizing or tinning plants. Mr. W. T. Flanders will continue to superintend the building and starting of all plants. Address

THOS. SANDS,

Nashua, - - - N. H.



J. POPPING'S
Patent
Machine & Tool Wks.

MANUFACTURERS OF

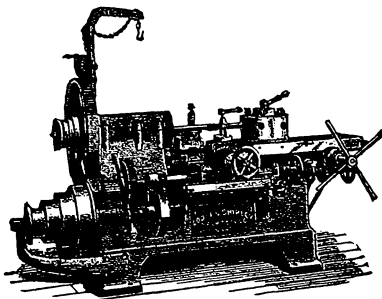
Solid Iron Shoulder Rabbit Planes, etc., etc. and Hofstatter's Patent Hair Picking machine.
N. E. Cor. 58 St. and 11th Ave., N. Y.

TURRET LATHES.

The Turret on saddle is an adjustable box tool. Large and long spindle.

Bed, head stock, tail stock and side rails one and the same casting. Immense power.

Especially designed for duplicating work. Absolutely rigid.



**The Lodge & Shipley
Machine Tool Co.,**

107-113 CULVERT STREET,

CINCINNATI, - - - OHIO.

Mfrs. of machinery for rapid turning and boring.

**FOR NUMBERING AND LABELING
Boxes, Drawers and Shelves**
In Hardware Stores and Factories.

Send for sample and description of our Handy Box of small gummed Letters and Figures, intended for labeling shelf boxes. Put up especially for the Hardware trade.

THE TABLET AND TICKET CO., Mfrs.,
97-99 Franklin St. Chicago.
99 Franklin St., New York.

**WILLSON'S
PAPER
LETTERS**

ENTIRE OUTFIT.

Machine AND Boiler Shop.

Modern Tools, A1 order.

SPECIAL LOW PRICES BEFORE REMOVAL.

ENGINE LATHES, 13, 15, 16, 18, 20 and 24 in. PLANERS, 20 x 4 ft., 22 x 5 ft., 24 x 8 ft.

UPRIGHT DRILLS, "Sensitive," 20 in. Plain and 24 in. Bk. Gears and Self Feed.

RADIAL DRILL, 5 ft. Arm, Swivel Head. SHAPERS, 8, 12 and 15 in. Stroke.

SCREW MACHINE, "Brown & Sharpe" No. 1, with Wire Feed.

SCREW MACHINE, "Garvin" No. 1, with Auto. Chuck, 1/2 in. Rod.

SCREW MACHINE, "Niles," 1 1/2 in. Hole, Bk. Gears, Carriage and Feed, Turret with Feed, Chucks and Tools.

MILLING MACHINE, Lincoln, with Vise. **VERTICAL TURRET CKG. MCH.**, 36 in., Brown & Sharpe.

UPRIGHT BORING AND TURNING MILL, 38 in.

PUNCH PRESSES, Power and Foot.

BOILER TOOLS.

PUNCH AND SHEARS, Single, Improved Style, punches 1 in. through 1 in. Steel, to center of 53 in. Weight, 11,000 lbs. Used 3 months.

BOILER BENDING ROLLS, 8 ft., Improved Style, with "Hinged Housing."

J. J. McCabe,

14 Dey St., New York.

Successor to E. P. Bullard's New York Machinery Warerooms.

For Sale Cheap.

Special lot of

NEW ENGINE LATHES,
ANY LENGTH OF BED.

Sizes 13, 15, 17, 20 and 22 in.

ADDRESS

Draper Machine Tool Co.,

Successors to

LATHE & MORSE TOOL CO.,

130 Gold Street.

WORCESTER, MASS.

WANTED.

Responsible parties to manufacture and sell on royalty, a cheap portable steel or iron **CULVERT BRIDGE**; it is adapted to all small streams, runs, etc., in roads, streets, **RAILROADS**, etc.; improved roads is the order of the day; use this bridge, put it below the level of the road, cover it over and thus prevent jarring and wear and tear of vehicles, etc. Apply to

W. A. NICHOLS,
Girard Building, Philadelphia, Pa.

FOR SALE OR HIRE.

Engines with Cylinders 26 in. x 48 in. and smaller.
Portable, Tubular and Vertical Boilers of all sizes.

13 2-yard 3-ft. gauge all around Dump Cars.
7 Narrow Gauge and 2 Standard Gauge Locomotives.

1 Large Worthington Duplex and other Pressure Pumps. New and Second hand.
Hoisting Engines and Grinding Pans.
Rail, Sheet and Clipping Shears.

THOMAS CARLIN'S SONS,
Allegheny, Pa.

STEAM PUMPS FOR SALE.

We have on hand
One new Worthington Pump, 7 1/2 x 4 1/2 x 10.
Also two second-hand Pumps, in good order.
One Smith Valve, 6 x 4 x 6.
One Knowles, 6 x 3 1/2 x 6.

HOOKE-COLVILLE STEAM PUMP CO.

St. Louis, Mo.

Send for descriptive catalogue of Hooker Pumping Machinery.

BARCAINS.

Second-hand Machinery. Good Condition.

1 2500-lb. Double Frame Steam Hammer. Fdk. Miles.
1 Planer 32 in. x 32 in. x 11 ft. Double head.
1 250-lb. Justice & Shaw Dead Stroke Hammer.
1 86 in. Boring Mill. Ed. Harrington & Son.
2 Cement Milling Machines.
1 Niles Screw Machine No. 2.
2 Small Crank Planers, 16 x 16 x 24 inches.
3 28-in. Schumacher Drill Presses, B. G. & P. F.
1 40-in. Schumacher Drill Press, B. G. & P. F.
1 48-in. Drill Press, B. G. & P. F.
1 Power Punch; capacity, 1/2-in. hole in 1/2-in. iron.
Throat 6 in. Parker, Snow & Co.
1 20 in. x 48 in. People's Works Horizontal Engine.
6, 8, 10, 15, 25 and 40 H. P. Hoisting Engines.
1 20 H. P. Eddy Electric Motor, 220 Volts.
1 50 H. P. Locomotive Boiler. Warden Mfg. Co.

L. F. SEYFERT'S SONS,

437-441 N. 3d St., Philadelphia, Pa.

METAL WORKING MACHINERY.

All kinds.

NEW AND SECOND HAND.

600 Machine Tools in Stock.

Send for lists of Second-hand Machinery and Secure Bargains.

PRENTISS TOOL & SUPPLY CO.,

115 Liberty Street, NEW YORK.

59 South Canal Street, CHICAGO, ILL.

PLANER, 28 in. x 26 in. x 8 ft., table. Good order \$350.00
30 in. x 30 in. x 6 ft., with chucks 225.00
14 in. Heavy Fitchburg Shaper. Fair order..... 150.00
24-in. Heavy Shifting Belt Shaper. New..... 300.00
Lathe, 30 in. x 18 1/2 ft. Excellent order..... 450.00
No. 1 Portable Drill, complete. Good as new.. 90.00
26 in. Hvy. Drill Press, Back G'd. Good as new. 125.00
2 1/2-in. Heavy Lever Feed Drill. New..... 64.00
Forging Drop, 100-lb. Hammer. New Design. 160.00
Wire Straightener and Cutter, Semi-Aut..... 60.00
Bolt Cutter, New Head and Dies 3/4 to 1 1/2 in. 175.00
Pratt & Whitney No. 1 Screw Mch., Wire Feed. 125.00
Power Punch Presses..... \$75.00 and upward.
AMER. TOOL WORKS., Cleveland, O.

SECOND-HAND MACHINISTS' TOOLS.

1 Planer, planes 15 ft. 42 in. x 42 in.
1 Planer, planes 6 ft. 32 in. x 25 in.
1 Planer, planes 8 ft. 24 in. x 24 in.
1 Planer, planes 5 ft. 24 in. x 24 in.
1 Planer, planes 4 ft. 24 in. x 24 in.
1 Crank Planer, 2 ft. 18 in. x 12 in. A1.
1 Engine Lathe, 18 ft. bed, 32 in. swing, for Boring and Turning.
1 Engine Lathe, 20 ft. bed, 60 in. swing, old style, 18 ft. 24 in. Lathe. [cheap.
1 17 ft. 18 in. Lathe.
1 10 ft. 17 in. Lathe.
3 6 ft. 14 in. Blaisdell Lathes.
2 6 ft. 15 in. Wood & Light Lathes.
1 Pratt & Whitney Cushioned Hammer.
1 475 lb. Drop Hammer, Merrill Pattern.
1 No. 21 Bliss Press.
2 20-in. Wheel and Lever Feed Drills.
1 28 in. Upright Plain Drill. Cheap.
1 1 H. P. Shipman Engine.
And various other tools.

NEW YORK MACHINERY DEPOT,
Bridge Store No. 16, on Frankfort St., New York.

FOR SALE.

1 each Garvin No. 2 & No. 4 Milling Machines, 2d hand.
1 Pratt & Whitney Lincoln Miller No. 3, 2d hand.
1 10 x 6 Engine Lathe, " "
1 G. A. Gray 19 x 8 Engine Lathe, " "
1 McMahon 17 x 8 Engine Lathe 2d hand.
1 Dietz & Gang 22 x 8 Engine Lathe, 2d hand.
1 New Haven 28 x 8
1 Dietz & Gang 30 in. Radial Drill, " "
1 each 20 in. Lever and Wheel and Lever Drills.
1 Baker Bros. Universal Saw Bench, new. [new.
1 each Lodge & Davis 15 in. and 20 in. Shaper, new.
THE LODGE & SHIPLEY MACHINE TOOL CO.,
107-113 Culvert St., Cincinnati, Ohio.

FOR SALE.

Fitchburg Automatic Vertical Engine, 14 in. x 14 in.
Wright Poppett Valve Engines, 16 in. x 36 in. and 12 in. x 32 in. F. McSWEGAN & SONS,
Dover St. and Franklin Square, New York.

FOR

MACHINERY

ADDRESS US.

Pennsylvania Mch. Co., Ltd.,

PHILADELPHIA, PA.

Machinery,

Second-Hand and New, on Hand.

No. 4, 3, 2 Stiles Punch Presses.
No. 1 1/2 and 0 Fowler Punch Presses.
No. 1 and 2 3-Screw Machines, Pratt & Whitney.
No. 1 Profiling Machine, " "
No. 3 Hand Miller, " "
15 x 5 Eng. Lathe, Taper Attch. " "
16 x 5 x 6 Eng. Lathe, Bridgeport Mch. Tool Wks.
200 lb. Drop Hammer, Bliss.

Magnetic Separating Machine, Dynamo for Electroplating, Shaping, Planing, Slotting Machines, all Sizes.

Engine Lathes from 11 inch Swing to 90 inch Swing.
Drill Presses, Regular, from 10 to 44 inch Swing.
" Radial, H. & Jones, 48 "

Gang Drills, 2 Spindle and 4 Spindle.
Lot of Special Drills for Butt Drilling.

Special Butt Milling Machine.
No. 12 Turret Lathe, 3 1/4 inch hole, Jones & Lamson.
No. 12 " " 24 inch Swing by 8 ft. Bed, Am.

T. & Mch. Co.
Lot of Polishing Mch., Leather Covered Wheels, etc.
Belting, Pulleys, Engines, etc., etc.

Boiler Shop Outfit of Machinery.

Send for our latest list or state what is required.

Warehouse, 511 & 513 West 13th St.

Office, 120 Broadway, New York.

Geo. Place Machine Co.

FOR SALE—SECOND-HAND.

3 Upright Corliss Boilers, 150 H.-P. each.
1 Locomotive Fire Box Boiler, 50 H.-P.
1 16 x 36 in. Slide Valve Engine.
1 14 x 42 Greene Engine.
1 16 x 42 Babcox & Wilcox.

Large assortment of Knowles, Blake and Worthington Steam Pumps. Write for prices and full description to

D. B. CRUICKSHANK,
Providence, R. I.

BOILERS THREE:

1 100 H.-P. 2 80 H.-P.

All Second-Hand.

The 100 H.-P. is Steel; the 80's are Iron. All have full Arch Fronts, Grates, Steam Blowers Safety, Water and Steam GAGES.

THE SCRANTON SUPPLY & MACHINERY CO.,
Scranton, Pa.

For Sale, Very Low for Cash.

500 tons Relaying Steel Street Rails, side bearing, 35 to 47 lb. sections. Also 65-lb. Steel T's.

WM. H. PERRY & CO., Providence, R. I.

FOR SALE.

2 Stokes & Parrish 7 in. x 9 in. Hoisting Engines.
3 No. 7 Knowles Pumps.
1 Worthington Duplex Pump, 10 x 6 x 10 in.
Lot 30 and 36 in. Plain Cylinder Boilers.
Lot 1 Beams, Stacks, &c.
At Merion Furnaces, West Conshohocken, Pa.
Apply for particulars to

POULTERER & COMPANY,

No. 26 Bullitt Building, Philadelphia, Pa.

FOR SALE.

1 Engine Lathe, 24 in. swing x 25 ft. bed.
Modern. First-class condition.
1 Lincoln Miller. Good order.
1 3 in. Cutting-off Machine. Nearly new.
1 No. 1, No. 2 and No. 3 Root's Blower.
Prices very reasonable.

COOKE & CO.,

163 and 165 Washington St., New York.

Great Bargains. Boilers AND Engines

Must be Sold and Removed.

- 16 in. x 30 in. Horizontal Engine.
- 18 in. x 36 in. Horizontal Engine.
- 24 in. x 36 in. Horizontal Engine.
- 19½ in. x 48 in. Beam Engine, with Knowles Condenser.

Write us for what you want.

LOVEGROVE & CO.,

Third and Quarry Sts., Philadelphia, Pa.

SECOND-HAND MACHINERY.

- One American Tool Co.'s No. 2 Cabinet Turret Lathe, with slide rest, in fine order.
- One Pratt & Whitney 36-in. Gap Chucking Lathe.
- One Pratt & Whitney No. 3 Lincoln Milling Machine.
- One Iron Planer, 52 in. wide, 44 in. high, 12 ft. long, with two heads.
- One Springfield Universal Grinding Machine No. 3, swing 18½ in. over the ways and take 6 ft. between centers. Has been used but a very few times and is practically new.
- One L. W. Pond Gear Cutter, to cut gears 36 in. diameter, 5 in. face, also arranged for cutting beveled gears.

HILL, CLARKE & CO.,
156 Oliver St., Boston, Mass.
12 and 14 South Canal St., Chicago, Ill.

WE ARE OFFERING

BARCAINS

from the equipment of the United Electric Traction Company's Works of Marion, N. J., comprising:

- Engine Lathes, from 14 in. to 48 in. swing.
- Hand Lathes, from 10 in. to 20 in. swing.
- Planers, from 24 in. x 5 ft. to 42 in. x 12 ft. Shapers, from 15 in. to 20 in. stroke.
- Drill Presses, all sizes up to 24 in. swing.
- Milling Machines, Plain and Universal.
- Brown & Sharpe Screw Machines.
- 1 Large Newton Slotting Machine.
- 1 Large Pond Mach. Tool Co.'s Radial Drill Press.
- 8 Gould & Eberhardt Automatic Gear Cutters, 36 in., 48 in. and 60 in.
- 1 Betts Machine Co. Large Horizontal Boring Mill.
- 2 Large Bliss Power Presses.
- 1 10 H.-P. Baxter Engine, with 15 H.-P. Boiler, complete. As good as new.
- Also Tool Grinders, Die Sinkers, Tapping Machines, Bolt Cutters and Large Pattern and Blacksmith Shop Equipments.
- These tools are in good order and of the very best makes in this country. They will be sold at remarkably low prices.
- Call at our salesroom and inspect them, or write for complete descriptive circular and price-list.

THE GARVIN MACHINE CO.,
Laight and Canal Sts., New York.

SOME BARGAINS HERE.

- 1 Hendey Shaper, 16 in. stroke, imp. vise.
- 1 14 x 6 Screw Cutting Engine Lathe; new.
- 1 6 in. hole in Turret Screw Machine and Counter, \$25.
- 2½ Hendey Cutting-off Machine. New.
- 1 3-spindle Garvin Drill Press, used 1 month.
- 100 H.-P. Woodbury Engine. 2d-hand. Good order.
- 2 50 H.-P. Woodbury Boilers. Good order.
- 2 75 H.-P. Woodbury Boilers. Good order.
- 1 20 H.-P. Woodbury Engine. 2d-hand.
- Also variety of Engines, Boiler Pumps, &c.
- And other machinery, new and second-hand. Write for prices. **Machinery Supply Company,** 39, 41 and 43 Central Ave., Rochester, N. Y.

WANTED.

Second-hand Power Press, size Bliss No. 20 or 21. Price must be low for cash.
ROBLEY & BRUNDAGE,
142 Chambers St., New York.

Boilers AND Engines

- 1 100 H.-P. Horizontal Tubular Boiler.
- 2 65 H.-P. Horizontal Tubular Boilers.
- 2 125 H.-P. Portable Boilers.
- 1 90 H.-P. Portable Boiler.
- 1 60 H.-P. Portable Boiler.
- 1 75 H.-P. Harrison Boiler.
- 1 50 H.-P. Galloway Boiler.
- 2 250 H.-P. Hazelton Boilers.
- 1 75 H.-P. 15½ in. x 24 in. Horizontal Engine.
- 1 50 H.-P. 12 in. x 24 in. Wright Engine.
- 1 20 H.-P. 9 in. x 12 in. Erie Engine.
- And many others.

THOS. P. CONARD,

206 Walnut Place, Philadelphia.

FOR SALE.

- 9 in. Potter & McDougall Steam Hammer.
- 500 ton Bushnell Knuckle Joint Press.
- 30 in. Inlet Sturtevant Blower and smaller.
- 5 tons ¾ in. and ½ in. Hoisting Chain.
- 1000 ft. 1½ in. Rods and Turnbuckles.

MARVIN BRIGGS, 12 Broadway, N. Y.

FOR SALE.

- ELECTRIC LIGHT PLANT (used 6 months).
- 1000 light Mather Dynamo.
- 125 H.-P. Dick & Church Compound Engine.
- 2 75 H.-P. Steel Boilers.

MARVIN BRIGGS, 12 Broadway, N. Y.

SECOND-HAND MACHINERY.

- 2 11 in. x 5 ft. Reed Engine Lathes.
- 2 11 in. x 5 ft. Prentice Lathes.
- 2 12 in. x 5 ft. Young Speed Lathes.
- 2 13 in. x 5 ft. Ames special Feature Lathes.
- 2 15 in. x 5 ft. Reed Engine Lathes.
- 1 15 in. x 8 ft. Young Lathe.
- 1 16 in. x 6 ft. Young Lathe.
- 1 16 in. x 6 ft. Perkins Lathe.
- 2 16 in. x 6 ft. Blaisdell Lathes.
- 1 16 in. x 6 ft. Flather Lathe.
- 1 18 in. x 8 ft. New Haven Lathe.
- 1 18 in. x 8 ft. Dustin Lathe.
- 2 20 in. x 6 ft. Bullard Lathes.
- 1 26 in. x 10 ft. Dustin Lathe.
- 2 20 in. x 8 ft. Bullard.
- 1 20 in. x 10 ft. Bullard.
- 1 20 in. x 13 ft. New Haven Lathe.
- 1 Dexter Pattern Lathe.
- 1 Bullard Turret Lathe.
- 2 Brainerd No. 7 Overhanging Arm Plain Millers.
- 2 Brainerd No. 7 Lincoln Plain Millers.
- 1 B. & S. No. 1 Universal Lathe.
- 1 Brainerd Heavy No. 6 Lincoln Pattern Miller.
- 1 Garvin No. 2 Miller and Screw Slotter.
- 1 No. 3 Garvin Plain Miller.
- 1 38 x 18 ft. N. Y. S. E. Lathe. Also large stock of new tools.
- 1 Garvin No. 4 Rack Feed Miller.
- 1 Brainerd No. 15 Universal Miller.
- 2 Brainerd No. 5 Universal Millers.
- 1 Blaisdell 30 in. Single Spindle Drill.
- 1 Wilder Punch Press.
- 1 Grindstone and Frame.
- 1 Garvin one-spindle Profiling Machine.
- 1 Garvin No. 2 three-spindle drill.
- 1 Garvin No. 3 four-spindle drill.
- 1 Garvin No. 4 four-spindle drill.
- 1 Garvin No. 2 Wire Feed Screw Machine.
- 1 Garvin No. 2 Plain Screw Machine.
- 1 Garvin Small Gear Cutter.
- 1 Dustin 18 in. wheel feed one-spindle Drill.
- 1 Brainerd Universal Cutter Grinder.
- 1 Band Saw.
- 1 Diamond No. 3 Emery Grinder on column.
- 1 Diamond Polishing Head.
- 1 Bullard 15 in. stroke Shaper.
- 1 16 in. Smith & Mills Shaper.
- 1 24 in. x 24 in. x 6 ft. New Haven Planer.
- 1 10 ft. Boring Mill.
- 1 8 ft. 4 in. Boring Mill.
- 1 76 in. x 60 in. x 13 ft. Planer.
- 1 48 in. Car Wheel Borer.
- 1 Syle Lathe.

NILES TOOL WORKS CO.,
136 & 138 Liberty St., N. Y. City.

MACHINERY, TOOLS, &c.

- IN STOCK, LARGE LINE OF NEW AND SECOND-hand engines, boilers and machinist's tools for sale or exchange. Below are some special bargains:
- 60 H.-P. Atlas Automatic engine.
- 20 H.-P. to 60 H.-P. plain slide valve horizontal engines.
- 2 H.-P. to 60 H.-P. vertical engines.
- Power shears, 1 in. iron, 36 in. Gap.
- 4½ in. Pratt & Whitney cut-off machine.
- 20 milling machines (Bement's).
- 6 H.-P. and 10 H.-P. hoisting engines with boilers.
- 1, 2, 4 and 6 H.-P. yacht engines.
- 4 H.-P. and 7 H.-P. gas engines.
- 4 50 H.-P. portable boilers.
- 10 H.-P. to 100 H.-P. horizontal and vertical boilers.
- 20 screw-cutting lathes of different sizes.
- Several rod-feed turning lathes.
- 6 in., 12 in. and 16 in. shapers.
- 24 in. and 36 in. planers.
- 44 in. radial drill, 14 National bolt heads.
- No. 3 Fowler press, 2 10 in. exhaust heads.
- 25 lbs. Bradley and 10 lbs. Hotchkiss Hammers.

FRANK TOOMEY,

131 N. Third St., Philadelphia, Pa.

- 4 3 H.-P. Vertical High Pressure Engines.
- 2 5 H.-P.
- 2 6 x 10 Horizontal Engines.
- 2 8 x 12 "
- 2 10 x 14 "
- 2 10 x 12 "
- 8 5 H.-P. Gas Engines.
- 5 10 H.-P.
- 1 8 x 12 D. C. Hoisting Engine.
- 3 Rock Crushers.

H. H. MANSFIELD,

126 Liberty St., New York.

CORLISS

and other Automatic Engines, Slide Valve Engines Boilers, Steam Pumps, Tanks, &c., &c.

CORLISS, 10 x 20; 10 x 24; 12 x 36; 14 x 30; 16 x 42; 22 x 36; 22 x 48; 26 x 48; 28 x 60; 30 x 60; 30 x 72; Porter-Allen, 14 x 30; Brown, 16 x 42.

HIGH SPEED AUTOMATIC, 12½ x 15; 14 x 18; 12 x 18; 11 x 20; 10½ x 12; 9½ x 12.

HORIZONTAL SLIDE VALVE, 28 x 36; 18 x 36; 16 x 48; 16 x 36; 14 x 24; 13 x 24; 12 x 24; 10 x 24; 12 x 18; 10 x 14; 10 x 12, and others.

VERTICAL SLIDE VALVE, 28 x 30; 20 x 24; 13 x 16; 13 x 12; 10 x 12; 10 x 10; 9 x 9; 8 x 10; 7 x 9; 7 x 7; 6 x 6.

ASSORTMENT OF BOILERS, Horizontal, 6 x 16; 5½ x 16; 5 x 16; 4 x 14; 4½ x 12, and others.

LOCOMOTIVE BOILERS, 15, 30, 45, 60, 60, 70, 100 and 150 H.-P.

ASSORTMENT OF STEAM PUMPS, 1000 gl. Duplex Fire Pump also Brennan Crusher, Bogardus Mill, Rock Drill, Burr Stone Mill, Fan Blowers, Platform Scales, Wood Planer, Rendering Tank, Open Tanks, Hoisters, Berryman Heaters, 600-ton Hydraulic Press, Boiler Rolls. Also some Large Steel Boilers, new, below market price. Send for catalogue.

GEO. M. CLAPP,
74 Cortlandt St., New York.

ROLLING MILL OUTFIT.

For Sale, the Following Machinery and Tools, in good order, for immediate or future delivery.

For further particulars apply to the undersigned:

- 1 Horizontal Low Pressure Engine, 59 in. x 72 in. x 2 Fly Wheels, 24 ft. diameter, each weighing 53 tons.
- 1 Vertical Engine, 7 in. x 16 in.
- 2 Horizontal Engines, 14 in. x 24 in.
- 1 2 High 30 in. train, complete.
- 1 3 High 30 in. train, complete.
- The above trains will roll 90 in. plates; also a lot of extra rolls, all made by Garrison & Co.
- 1 Roll Turning Lathe made by Garrison, will take in 12 ft. roll and turn up to 40 in.
- 1 Guillotine Shear, Engine attached, made by Morgan, Williams & Co., knife 104 in. long, will cut 1 inch steel plates.
- 2 Plate Straightening Machines.
- 1 Adams' Plate Shear, 48 in. throat, 26 in. knife, will cut up to ¾ in. Plate.
- 2 Heavy Upright Plate Shears, 12 in. throat, 22 in. knife, will cut up to 1¼ in. Plate.
- 2 Bar Shears.
- 1 Rotary Shear.
- 1 Fairbank's Testing Machine, with counter-shaft, or can be worked by hand power.
- 4 Large Iron Cranes, improved pattern, each about 25 tons capacity.
- 8 Small Cranes, also charging Cranes and Portable Cranes on car for handling Ingots.
- Blake rump, 14 in. stream, 16 in. water.
- 2 Worthington Duplex Pumps.
- 1 Blake Pump, No. 7.
- 1 Sturtevant Blower, No. 12.
- 3 Tubular Boilers, with Fronts and Attachments.
- 1 No. 7 Brush Light Machine, 15 Double Lamp.
- Also Furnaces, Cylinder and Flue Boilers, Buggies, Shunting, Pipe Stacks, etc., etc., and other tools, etc., belonging to above plant.

MATTHEW GILL, Jr.,
308 Walnut St., Philadelphia, Pa.

!!! FOR SALE !!!

- BAKER BLOWERS, Nos. 1, 4½, 5, 6 and 7.
- ROOT BLOWERS, Nos. 1, 2, 3, 4, 5, 6 and 7.
- Sturtevant Blowers, Nos. 4, 5, 6, &c.
- 1 Corliss Band Wheel, 12 ft. x 24 in. in halves.
- A Variety of Machinery, such as Boilers, Engines, Pumps, Crushers, &c., very cheap.

Do you want to buy or sell Machinery? If so, write **C. R. BIGELOW, Machinery Expert,** 45 Dey St., New York City.

16 INCH FLAT MILL.

For sale cheap. Made by Garrison & Co., Pittsburgh; complete and modern; 3-roll high, flywheel 20 tons, 5 sets Housings, pinions, rolls, bedplates, &c., in perfect condition. Address

G. W. SCHULTZ & CO.,
308 Walnut St., PHILADELPHIA.

FOR QUICK SALE.

One Otis Steam Shovel in good condition. Two 12 ton 3-ft. Gauge Locomotives. Two Standard Gauge Saddle Tank Locomotives. 20 Dump Cars, 3-ft. Gauge, 3-yd. Capacity, Side Dump. 3600 tons Mill Cinder, &c. Also Pig Iron, Muck Bars, Bar Iron and Steel Billets, Scrap, &c. we are always in the market to buy and sell Equipment and Scrap. **G. H. SIBELL & CO.,** 62 and 64 Michigan Ave., Chicago, Ill

SALE OF VALUABLE PROPERTY
of the corporation known heretofore as The Albany Stove Company. Whereas, by order of the Supreme Court of the State of New York, granted in the City of Albany, N. Y., on the 10th day of October, 1893, the undersigned, receiver of the assets and effects of the corporation known heretofore as The Albany Stove Company, was directed to offer for sale the following described property, viz.: The real estate and buildings owned by the said corporation "The Albany Stove Company," situated on Tivoli street, in the City of Albany, N. Y., being the same premises used by the said corporation in carrying on its business of manufacturing stoves and iron castings, and is the same real estate conveyed by Eugene Van Rensselaer and others, as executors, etc., to the Capital Co-operative Foundry Company, by deed dated October 15, 1890, recorded in Albany County Clerk's office, December 15, 1890, in Book No. 228 of Deeds, on page 241, and by Van Rensselaer Land Company to Albany Stove Company by deed dated January 10, 1890, recorded January 14, 1890, in Book No. 412 of Deeds, on page 318, together with the machinery, tools and implements used in carrying on the business above referred to.

Now, therefore, in pursuance of said order, the undersigned offers for sale to the highest bidder the property above described.

All bids to be sealed, and must be distinctly marked, on the envelope in which they are enclosed, "Bids for property of the Albany Stove Company," and addressed and delivered to the undersigned at No. 82 State street, Albany, New York, on or before the 17th day of November, 1893. The right to reject any and all bids is hereby reserved, and sale can only be completed upon order of the court.

Bids will be opened by the receiver at the office of Francis H. Woods, No. 116 State street, Albany, New York, on Saturday, November 18, 1893, at 10 A.M. Terms, purchase price to be paid within twenty days after notification of acceptance of bid.

Dated October 11, 1893.

JOHN GUTMANN,

Receiver of The Albany Stove Company.

SALE OF VALUABLE PROPERTY
of the corporation known heretofore as The Albany Stove Company. Whereas, by order of the Supreme Court, granted in the city of Albany, N. Y., on the 10th day of October, 1893, the undersigned, receiver of the assets and effects of the corporation known heretofore as The Albany Stove Company, was directed to offer for sale the following described property, viz.: The patterns, shop rights and flasks owned by the said corporation, and being the patterns, shop rights and flasks for the "Home Yale" parlor and range, "Yale" cook, "White Oak," "Art Yale Range," "Rose" range, "Oneida," and for other castings, formerly manufactured by the said corporation, a more particular description of which will be given on application to the undersigned.

Now, therefore, in pursuance of said order, the undersigned offers for sale to the highest bidder the property above described.

All bids to be sealed and must be distinctly marked on the envelope in which they are enclosed, "Bids for property of The Albany Stove Company," and addressed and delivered to the undersigned, at No. 82 State street, Albany, N. Y., on or before the 17th day of November, 1893.

The right to reject any and all bids is hereby reserved, and sale can only be completed upon order of the court. Bids will be opened by the receiver at the office of Francis H. Woods, No. 116 State street, Albany, New York, on Saturday, November 18th, 1893, at 10 A.M.

Terms: Purchase price to be paid within twenty days after notification of acceptance of bid.

Dated October 11th, 1893.

JOHN GUTMANN,

Receiver of The Albany Stove Company.

FOR SALE, CHEAP.

400 tons of 60-pound, 200 tons 52-pound and 400 tons of 30-pound second-hand Steel Rails, suitable for relaying. For prices, etc., address

J. H. RICHARDSON & CO.,

Pittsburgh, Pa.

FOR SALE.

2 Double Deck Boilers about 40 H.-P. each, cheap. Hoisting Engine. Cylinder Boilers for Stacks, 30, 40 and 42 in. diameter. Round and Square Iron Tanks. Book Binding Machinery. Smoke Stacks, light and heavy, all sizes. Large lot Cast and Wrought Scrap Iron on hand. Also Dealers in Metals.

BUSSENIUS & CUNLIFFE,
12th and Washington Ave., Philadelphia.

FOR SALE.

CRANK and GEARED SHAPERS.

Write us for Bargains.

J. STEPTOE & CO., Cincinnati, O.

PITTSBURGH

SALES AGENCY,

J. H. HILLMAN, Manager,

No. 8 Wood St.,

Pittsburgh, Pa.,

IS NOW ENGAGED IN THE

Sale AND Reorganization

—OF—

Manufacturing Plants,

INCLUDING

Blast Furnaces, Rolling Mills, Machine Shops, Foundries, Agricultural Works, and Manufacturing Establishments Generally.

Examinations and Reports

on Properties.

References on Application.

Second-Hand Rails FOR SALE.

In lots to suit, and ready for delivery.

2000 tons 60 lb. Steel T Rails.
800 tons 54 lb. Steel T Rails.
400 tons 50 lb. Steel T Rails.
550 tons 50 lb. Iron T Rails.
600 tons 45 lb. Iron T Rails.
2000 tons 40 lb. Steel T Rails.
600 tons 30 lb. Steel T Rails.
150 tons 30 lb. Steel T Rails.
200 tons 25 lb. Steel T Rails.
1700 tons Johnson Girder Rails, 38, 48, 52 and 66 lb. Rails.

All selected and in excellent condition for relaying and only slightly worn. For prices and particulars apply to

JOSEPH JEWKES,

Railway Equipment, Pittsburgh, Pa.

Trustee's Sale of Machine Shop Equipment.

Lathes, 52 in. swing by 41 ft., 54 in. swing by 22 ft., 30 in. swing by 22 ft. One 6 ft Lathes.
Planers, 54 in. wide by 20 ft., 36 in. wide by 13 ft.
Drills, 36 in. upright, 5 ft. post, 20 in. post.
Engines, 5 new and 7 second-hand, from 100 H.-P down.

Circular on application.

W. A. BOLE, Trustee,

Liberty Ave., cor. 25th St.,

Pittsburgh, Pa.

WANTED.

Machinery to manufacture.—Machinery built of Wood and Iron, or all Iron only, wanted, same must be of real merit.

J. M. KRAMER & BRO. MACHINE WORKS,
Maria Stein, Ohio.

WANTED.

A second-hand Squeezer in good order and modern construction, with or without Engine. Name lowest price for cash. Address

"H."

Office of The Iron Age, 220 South 4th St., Philadelphia, Pa.

FOR SALE

Selected Second-hand Rails.

800 tons 35-lb. Tee Iron Rails, 100 tons 30-lb. Tee Iron Rails, all in good condition for relaying, complete with fish plates and spikes. Also several complete switches. Apply to

BRONSON BROS.,

Painted Post, N. Y.

TO LET

In the "IRON AGE" Building,
FOR OFFICES OR STORES,
96-102 Reade Street.

FIRST LOFT, 50 FEET FRONT.

THIRD LOFTS, 100 FEET FRONT.

To Let for Light Manufacturing Business,

Fourth and Fifth Lofts, 50 Feet Front.

Excellent Light, Elevator, Power and Steam Heat.

APPLY TO

WM. C. WALKER'S SONS,
299½ Broadway.

CHARLES WEILAND.

I make a special business of buying and selling Job Lots of

HARDWARE AND CUTLERY.

Tools and Second Quality Files a Specialty.
Send for Catalogue,

149 Chambers St., New York

WE ARE LOOKING FOR NEW NOVELTIES TO MANUFACTURE.

If this concerns you

please communicate with us at once.

THE BRIDGEPORT GUN IMPLEMENT CO.,

313-315 Broadway, New York.

WE OFFER FOR SALE BALANCE OF STOCK OF IRON AND STEEL,

Consisting of Bar, Band, Hoop and Scroll Iron and Spring and Plow Steel, at

1 CENT PER LB.

About 40 tons in all.

List of sizes on application.

JOHN S. LENG'S SON & CO.,

4 Fletcher St. - - NEW YORK.

DON'T INVEST in expensive machinery or let a contract until you get our estimate for making novelties or parts. Our work on novelties or fine, difficult and accurate parts astonishes the trade. White metal work a specialty, and our results cannot be duplicated at the same cost. Write us. Sample on application. Inventions perfected. Secrecy and satisfaction guaranteed. THE H. H. FRANKLIN MFG. CO., Syracuse, N. Y.

Bicycle Manufacturing Plant For Sale.

Located in a prominent Western city and adapted to the manufacture of bicycles of any grade. Capital required, \$75,000 to \$100,000. For particulars address The R. M. Co., P. O. Box 31, Cincinnati, O.

Receiver's Sale. Locations for Factories.

Notice is hereby given that the undersigned Receiver of The Vienna Enamel & Stamping Company, will sell the assets of said corporation at private sale to the highest bidder. Bids will be received on and after November 10th and up to November 20th, 1893. The plant is situated at Porter, Porter County, Indiana; all the main buildings are made of brick and have been recently erected and the machinery is new. It is located on two and one-half blocks of ground; there are three railroads within a few rods of it; and it is about forty miles from Chicago. There is also a large amount of manufactured product and of raw material on hand. In fact, there is everything ready to start up with the business.

Terms of Sale: The plant with tools and fixtures will be offered together for one third cash and the balance in equal payments of twelve and eighteen months; the purchaser to give his notes with mortgage on the premises to secure the same, with interest at six per cent. payable annually, and he must keep the property insured in good companies to an amount sufficient to cover loss by fire, payable to the receiver. The manufactured and the raw material will each be offered separately, and the whole will be sold for all cash or one-half cash and the balance in six months; the purchaser giving his note with approved security for the deferred payments, with interest at six per cent.

All bids on the plant, fixtures and tools must be accompanied by a deposit of two thousand dollars cash, conditioned that the bidder will make good his bid if accepted; and all bids on the personal property must be accompanied by a like deposit of two thousand dollars.

EDWARD ECKL,

Receiver of The Vienna Enamel and Stamping Company.

IRON WORKS FOR SALE.

To close estate of John R. Smith, late of Springfield, Mass., the executors offer for sale the old established business of the Springfield Iron works, including real estate, stock and machinery.

This is a live business in ornamental and building iron, machine and drop forgings, bolts, bridges, iron and steel structural work, fire escapes, etc., with several large contracts at the present time, including a State building at Concord, N. H., to be carried out. Mr. John R. Smith was successor to the bridge business of A. D. Briggs & Co. The business is old and well established. Inquire of

RALPH W. ELLIS, Atty.,
Springfield, Mass.

COAL LAND.

Eight thousand (8000) acres of Coal Land, containing two seams, one of four to six (4 to 6) ft. thick above water level; and one seam seven (7) ft. below water level. Good railroad and river facilities. Titles good. Will be sold cheap for cash. Map can be seen by calling or writing to

RINARD & WILLIAMS,
Box 267, Braddock, Pa.

FOR SALE.

A Rolling Mill, not far from Chicago; Cheap Fuel, Cheap Scrap; Good Machinery, comprising 9 in., 12 in. and 18 in. trains, in first-class condition. Can show a profit of \$7 to \$10 per ton on all iron made since mill has been in operation. Don't apply unless you mean business. Other engagements reason for selling. Address "S. F.," No. 1026.

office of *The Iron Age*, 96-102 Reade St., N. Y.

AN OLD ESTABLISHED hardware house in New York, whose salesmen cover the entire United States, wants the sole agency of American manufacturers of Chains, Toilet Clippers, Locks, Files, Carpenters' Tools and similar articles. Address

"W. B. G.," No. 105,

office of *The Iron Age*, 96-102 Reade St., New York.

WANTED

Partner to take half interest in established hardware and house furnishing store in Baltimore, Md.; \$5000 required; want to increase stock is reason for selling. Address "HIRAM," office of *The Iron Age*, 96-102 Reade St., N. Y.

The Industrial Department of the Chicago, Milwaukee & St. Paul Railway has charge of matters pertaining to the development of the territory traversed by the railroad and the directing of manufacturers to points best suited to their particular requirements.

Eight States are traversed by the 6,150 miles of the Chicago, Milwaukee & St. Paul Railway's tracks, namely: Illinois, Wisconsin, Northern Michigan, Iowa, Missouri, Minnesota, South Dakota and North Dakota.

The company is daily in touch with the people in its territory, and from the number and varied nature of the industries locating and springing up on the line, and its acquaintance with the natural resources, has the facilities at hand to promptly furnish manufacturers with reliable information as to locations adapted to particular industries.

LUIS JACKSON,

Industrial Commissioner,
C., M. & St. P. R'y, 160 Adams Street,
Chicago, Ill.

Wanted, Contracts

For building mining, blast furnace, rolling mill and factory machinery, for making castings for cable and electric railroads, or any special line of castings. Address

MAHONING FOUNDRY AND MACHINE SHOP

Danville, Pennsylvania.

BLOWING ENGINE FOR SALE

Vertical pattern, with balanced steam slide valve gear, steam cylinder 14 in. diameter, air cylinder 40 in. diameter, stroke 24 in. 1 to 100 strokes per minute; engine new.

JAMES LEFFEL & CO., Springfield, Ohio.

EUGENE BISSELL, Auctioneer.
E. BISSELL, SON & CO.,

Successors to
HAYDOCK & BISSELL,
WHOLESALE

HARDWARE AUCTIONEERS,
12 Murray St. and 15 Park Place, N. Y.
Sales held weekly for the trade. Consignments solicited. We refer to the leading manufacturers and importers.

LUXURY ON WHEELS.

The "Electric" trains of the Cincinnati, Hamilton & Dayton R. R. and "Monon" Route between Cincinnati and Chicago are provided with the latest product of the Pullman Co. built expressly for this service. There are 10 compartments in each car, which may be converted at will into complete drawing rooms, most beautifully and harmoniously decorated, lighted by the Pintsch gas system, and are positively the most modern equipped sleeping cars in the world. This is the only line running Pullman Vestibule and Dining Cars between the cities named. THE World's Fair Route. See that your ticket reads C., H. & D. and Monon Route.

D. G. EDWARDS, G. P. & T. Agent,
Cincinnati, O.

FOR SALE.

Good stock of Hardware, invoice \$5,000, good store building with living rooms above, valued at \$2,500, in a good town in Southwestern Minnesota; only hardware store in the town; good established trade of \$15,000 a year. This is a rare chance to go into business. Address

F. A. & A. J. MEACHAM,
Edgerton, Minn.

WANTED.

Practical Boiler Maker with small capital and business, to take interest in small shop. Fair business established and a good opportunity to an energetic man of ability. Applicants must be well recommended as to mechanical ability and moral character, and other things equal American preferred. Address

W. B. & S.,
office of *The Iron Age*, 96-102 Reade St., New York.

FLOOR PLATES.

FOR SALE.—A Superior Lot of Cast Iron Plates 2 ft. x 4 ft. They are made to avoid warping and cracking. Will sell in lots to suit.

MATTHEW GILL, JR.,
308 Walnut St., Philadelphia, Pa.

WANTED.

To furnish reasonable estimates on specialties in light metal work.

CLARK & COWLES, Plainville, Conn.,
Manufacturers of Clock Trimmings, Rivets,
Springs, &c.

Collections!

ATTENTION! Merchants and Manufacturers.—We collect your past due accounts. Do not let them remain too long upon your books. Our terms just and fair.

THE HARDWARE BOARD OF TRADE, Ltd.,
4 and 6 Warren street, New York.
JAS. H. GOLDEY, Treas.

C. F. RICE,

206 So. Green St., - - CHICAGO.

Largest wholesale house in America for Mirrors of all kinds, Pictures, Mouldings, Frames, Brackets, Easels, Screens and kindred goods. Large illustrated catalogue sent to Dealers upon application.



Useful Receipt Books for Reference.

SEND FOR CIRCULARS OF CONTENTS.

THE ENGLISH AND AMERICAN MECHANIC:

An Every-day Hand-Book for the Workshop and the Factory.

CONTAINING
SEVERAL THOUSAND RECEIPTS, RULES AND TABLES INDISPENSABLE TO THE MECHANIC, THE ARTISAN AND THE MANUFACTURER.

By VAN CLEVE and EDWARDS.
500 Pages, Cloth, \$2.00.

THE TECHNO-CHEMICAL RECEIPT BOOK.

CONTAINING
SEVERAL THOUSAND RECEIPTS, COVERING THE LATEST MOST IMPORTANT AND MOST USEFUL DISCOVERIES IN CHEMICAL TECHNOLOGY, AND THEIR PRACTICAL APPLICATION IN THE ARTS AND THE INDUSTRIES.

Edited from the German with Additions by

WILLIAM T. BRANNT
495 Pages, Cloth, \$2.00.

KEY TO STEAM ENGINEERING.

Embracing important questions answered concerning the steam engine and boiler.

By H. S. WILLIAMS.

174 Pages, 18mo, Cloth, 50 Cents.

Sent post-paid on receipt of price, by

DAVID WILLIAMS, Publisher & Bookseller,
96-102 Reade St., New York.

SITUATIONS WANTED.

Undisplayed Advertisements for Situations Wanted not exceeding fifty words Fifty Cents each insertion. Additional words one cent each.

A WELL KNOWN and successful Blast Furnace Superintendent or Founder will be open for engagement after Oct. 1st, 1893. Is thoroughly competent as constructor or in the management. Practical, theoretical and in touch with latest improvements in blast furnace practice. First-class record and references. Address "BLAST FURNACE, No. 921," office of *The Iron Age*, 96-102 Reade street, New York.

OPEN FOR ENGAGEMENT for 1894, middle aged experienced traveling salesman in hardware lines, tools or cutlery; not afraid of any good line of goods; Al references as to character and ability; desires position where ability, energy and character will be appreciated, and fairly paid. Address "ENERGY," office of *The Iron Age*, Rooms 22-24 Pickering Building, Cincinnati, Ohio.

AS FOREMAN in iron or steel foundry; have ten years' experience in iron foundry, three years in casting draw bars and knuckles in steel foundry; can furnish first-class references. Address "FOREMAN," office of *The Iron Age*, 59 Dearborn St., Chicago.

BY A MASON, steady man, as furnace builder; used to all kinds of furnaces; will go South or West. Address ARTHUR OLDFIELD, Boonton, N. J.

BY A YOUNG MAN, in a retail or wholesale hardware establishment, the latter preferred; ultimate object, a position as traveling salesman; have had five years' experience in shelf goods, builders' materials and glass; can keep books and am not afraid of hard work; best of references given. Address GEO. GONSER, Darlington, Ind.

BY A THOROUGHLY competent man, having had fifteen years' experience in charge of bridge and machine shops, and some experience in shop inspection; can give best of references. Address "BRIDGE," office of *The Iron Age*, 96-102 Reade St., New York.

AN EXPERIENCED SALESMAN, well acquainted with the trade, desires a position with a responsible firm; eight years' experience; best of references. Address, "EXPERIENCE," office of *The Iron Age*, 220 So. 4th St., Philadelphia, Pa.

BY A FOREMAN in architectural iron works; a practical mechanic, competent and trustworthy, with over fifteen years' experience as shop foreman; is perfectly familiar with the different branches of architectural iron work; can take dimensions and lay out work; understands drawings and handling of help economically; testimonials Al. Address "TEE," office of *The Iron Age*, 96-102 Reade St., New York.

AN EXPERIENCED OFFICE MAN, who can furnish references of a high order, now on his tenth year with agricultural implement manufacturing concern, desires to better his condition. Address "KANUCK," office of *The Iron Age*, 96-102 Reade St., New York.

AS MANAGER or foreman of a wire mill; have a thorough and practical knowledge of the wire trade in all its branches; twenty-five years' experience, twelve years as foreman; have charge of a large mill at present; am a good all-round mechanic, understanding the working of wire mill machinery and the building of annealing furnaces, bluing ovens, &c.; am strictly temperate and can furnish the best of recommendations from past and present employers; desiring a man that knows how to practice economy and run a mill on business principles will find it to their advantage to correspond with me. Address "TEMPERED STEEL WIRE," office of *The Iron Age*, 220 So. 4th St., Philadelphia.

AS FOREMAN of iron foundry, by a competent and reliable man; best of references. Address "Geo. B. F.," office of *The Iron Age*, 96-102 Reade St., New York.

BY SUCCESSFUL Stamping Works Superintendent, thorough machinist, die maker; large experience laying out plans, starting and running new works, designing, building, labor saving tools and machinery; Al manager of men, factory or machine shop; controls stamped article, pays good profit to manufacturer; best reference. Address "STAMPING," office of *The Iron Age*, 96-102 Reade St., New York.

A YOUNG MAN, 25, will change position; eight years with well known and one of largest concerns manufacturing builders' hardware (four as bookkeeper and assistant manager); quick; accurate accountant; experienced in able and economical management, all operating prices and complete data; thoroughly familiar with labor, costs, supplies, etc.; hard worker; can superintend; highest references; satisfactory reasons. "BUSINESS," No. 1019, office of *The Iron Age*, 96-102 Reade St., N. Y.

SUPERINTENDENT or Chief Engineer, by a mechanical engineer of 15 years' experience in general engineering, hydraulics, cranes, sheet, plate and structural iron work, &c.; any one who wants an energetic man to look after their interests will answer this ad. "HUSLER," No. 1019, office of *The Iron Age*, 96-102 Reade St.

BY A MAN who has had 14 years' experience as manager in a large retail hardware and implement house in the Southwest, as salesman or manager in a similar house; would accept a position as traveler, should the trade in territory allotted justify. Address "H. and I.," Box 1012, office of *The Iron Age*, 96-102 Reade St., N. Y.

BY A PRACTICAL Rolling Mill Man of experience and ability, as manager; is thoroughly competent and reliable; engaged now with a large concern who are going out of business. Address "MANAGER," No. 1012, office of *The Iron Age*, 96-102 Reade St., New York.

BY A THOROUGHLY Practical Sheet Mill Manager of many years' experience; good references. Address "CASTLE," office of *The Iron Age*, 96-102 Reade St., New York.

RESPONSIBLE POSITION by a graduated chemist and engineer in steel works or furnace plants; reference President Midland Blast Furnace Co. Address C. W. Kolbe, Midland, Mo.

BY A MEMBER of the A. S. M. E., expert in shop management and economical production of machinery, as superintendent or manager; well posted on dynamical, hydraulic and mechanical engineering and inspection of materials. Address "W. O. W.," office of *The Iron Age*, 96-102 Reade St., New York.

BY A MAN, who has had years of experience as superintendent and manager of both iron and steel mills, a position as superintendent or assistant; will work for a moderate salary; best of references; am a good draftsman and can furnish drawings and working plans for new mill; have built several from ground up. Address "NEW MILL," office of *The Iron Age*, 96-102 Reade St., New York.

HELP WANTED.

Undisplayed Advertisements for Help Wanted not exceeding fifty words One Dollar each insertion. Additional words two cents each.

SALESMAN with experience and trade in cutlery and hardware in New York State; state salary expected and where last employed. Address "EXPERIENCE AND TRADE," office of *The Iron Age*, 96-102 Reade St., New York.

EXPERIENCED pig iron salesman, one acquainted with the Cincinnati and Western trade; state salary wanted. Address "B.," office of *The Iron Age*, Rooms 22-24 Pickering Building, Cincinnati, Ohio.

TO REPRESENT in Austria American manufacturers of skates and of metal novelties; first class references. Address "EMIL M.," III Adamsgasse 5, Vienna, Austria.

AN EXPERIENCED MAN as Superintendent of manufacturing company, having an established trade on a ready selling article; must have first-class recommendations and be prepared to take stock in company. Address "READY SELLING," office of *The Iron Age*, 96-102 Reade St., New York.

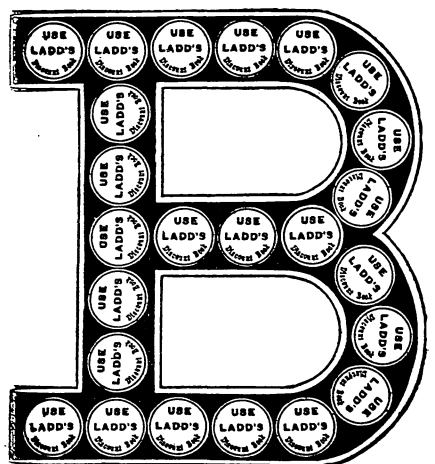
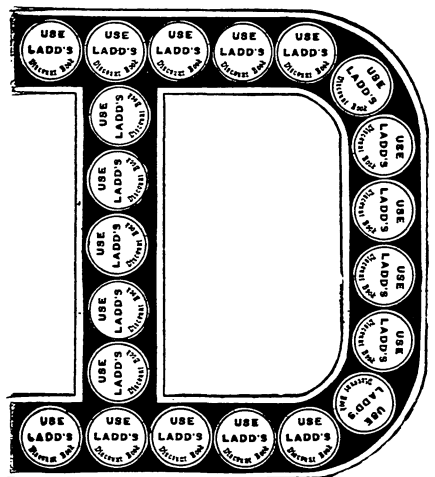
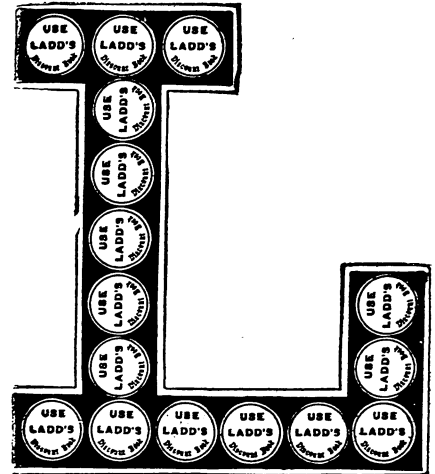
EXPERIENCED MAN to solicit orders for castings for gray iron foundry doing job work exclusively; a good position for the right man. Address "JOBING," office of *The Iron Age*, 96-102 Reade St., New York.

SALESMAN traveling the jobbing and large retail trade in the East, one in the West, and one in the South, to handle line of hardware specialties as side line; salary or commission; the line is too small for manufacturer to travel alone. Address "L.," office of *The Iron Age*, 220 S. Fourth St., Philadelphia.

A GOOD SALESMAN calling on mill owners and users of boilers, to introduce a first-class boiler compound on commission. Address THE VEGETABLE BOILER COMPOUND CO., Utica, N. Y.

COMPETENT FOREMAN, in wrought iron and wire factory; must be experienced in all its branches; give references and salary expected. Address "WIRE AND IRON WORKER," office of *The Iron Age*, Bank of Commerce Building, St. Louis.

SALESMAN drumming the hardware trade to handle as a side line, on commission, Mason's patent door lock and ventilator combined; new and salable. BROOKLYN SPECIALTY CO., 166 Pierrepont St., Brooklyn, N. Y.

**ACCURATE.****RAPID,****CONVENIENT,
PRACTICAL.****PRICE, THREE DOLLARS.****DOUBLE INDEXED EDITION, \$4.00.**

Sent, postpaid, to any address upon receipt of price.

DAVID WILLIAMS,

Publisher and Bookseller

96-102 Reade St., New York.

THE LATEST BOOKS.

The Colliery Manager's Handbook. By CALEB PAMELY. A comprehensive treatise on the laying out and working of collieries. A book of reference for colliery managers and for the use of coal mining students preparing for first-class certificates. 600 pages and 500 illustrations. Second edition revised with additions. 8vo, cloth..... \$8.50

Cements, Pastes, Glues and Gums. By H. C. STANDAGE. A practical guide to the manufacture and application of the various agglutinants required in the building, metal working, wood working and leather working trades, &c. With upward of 600 recipes and formulae. 12mo, cloth, \$1.00

A History of the Theory of Elasticity and of the Strength of Materials, from Galilei to the Present Time. By ISAAC TODHUNTER, D.Sc., F.R.A. Edited and completed for the Syndics of the University Press by Karl Pearson, M.A. Vol II, Saint-Venant to Lord Kelvin. Parts I and II. 8vo, cloth..... \$7.50

Experimental Electricity. By E. T. TREVERT. Numerous illustrations. New revised and enlarged edition. 12mo, cloth..... \$1.00

Civil Engineering, Public Works and Architecture. By Prof. WM. WALSON. Extract from reports on Paris Universal Exposition, 1891. Illustrations and plates. 8vo, cloth..... \$3.00

Heat. By MARK R. WRIGHT. With 136 illustrations. 346 pages. 12mo, cloth..... \$1.50
The present work is intended for those who have read the elementary parts of the subject, as treated in the author's "Sound, Light and Heat," or who are able to understand a more advanced work.

The Miners' Handbook. By JOHN MILNE. A handy book of reference on the subject of mineral deposits, and other interesting mining matters. 16mo, cloth..... \$3.00

Arts and Crafts. By WM. MORRIS. Essays by the Members of the Arts and Crafts Exhibition. 12mo, cloth..... \$2.50

British Locomotives: Their History, Construction, and Modern Development. By C. J. BOWEN COOKE. With numerous illustrations from sketches and diagrams and reproductions of official drawings and photographs. 12mo, cloth..... \$2.00

Continuous Current Dynamos and Motors. By FRANK P. COXE. An elementary treatise for students and engineers. Illustrated. 12mo, cloth, \$2.00

The Ore Deposits of the United States. By JAS. F. KEMP. A condensed account of the metaliferous resources of the country. As a text book and work of reference. 8vo, cloth. Illustrated. \$4.00

Tables for the Determination of the Rock-forming Minerals. Compiled by F. LEOWINSON-LESSING. Translated from the Russian by J. W. Gregory, B.Sc., F.G.S. With a chapter on the Petrological Microscope by Prof. Greenville A. J. Cole, M.R.I.A., F.G.S. 8vo, cloth..... \$1.25

Handbook of Ornament. By FRANZ SALES MEYER. A grammar of art industrial and architectural designing in all its branches, for practical as well as theoretical use. Authorized English edition. 580 pages, illustrated, cloth..... \$3.60

Plumbing, Drainage, Water Supply and Hot Water Fitting. By JOHN SMEATON. 222 illustrations. 8vo, cloth..... \$3.00
Contents: Introduction; drainage; danger from city wells; external plumbing; internal plumbing and fittings; sanitary plumbing; water service, and tapping of mains under pressure; water supply; ornamental leadwork; heating; hot-water work; index.

Handbook on the Steam Engine. Translated by H. H. P. POWLES. 12mo, cloth..... \$3.50

Steamships and Their Machinery. From first to last. By J. W. C. HALDANE. 8vo, cloth..... \$6.00

The Progress of Marine Engineering, from the Time of Watt to the Present Day. By THOS. MAIN. 67 illustrations. 12mo, cloth..... \$3.00

Edwards' 900 Examination Questions and Answers for Engineers and Firemen, Stationary and Marine, who Desire to Obtain a U. S. Government or State License. By EMORY EDWARDS, Marine and Mechanical Engineer, Associate Editor "The American Shipbuilder." A new revised and enlarged edition. In one volume. 240 pages. Full bound in pocket-book form, leather, gilt edges. \$1.50

Principles of Fitting. For apprentices and Students in Technical Schools. By a Foreman Pattern Maker. 318 pages, 12mo, cloth..... \$1.50

Pocket Book of Useful Formulae and Memoranda for Civil and Mechanical Engineers. By G. L. MOLESWORTH. Twenty-third edition, revised and enlarged. 782 pages, 32mo, roan, gilt edges..... \$2.00

Hydraulic Power and Hydraulic Machinery. By H. ROBINSON. Second edition revised and enlarged. 60 plates and numerous illustrations. 8vo, cloth..... \$18.50

Varnishes, Lacquers, Printing Inks and Sealing Waxes: Their Raw Materials and Their Manufacture. By W. T. BRANNT, to which is added the art of varnishing and lacquering, including the preparation of putties and of stains for wood, ivory, bone, horn and leather. 336 pages with 39 engravings. 12mo, cloth..... \$3.00

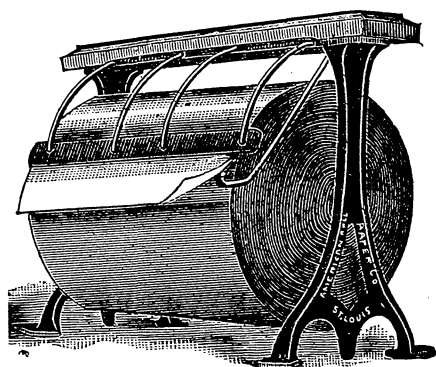
Twenty Years' Practical Experience of Natural Asphalt and Mineral Bitumen. By W. H. DELANO. Illustrated. 12mo, parchment..... 50c

Universal Bimetallism and an International Monetary Clearing House. With a record of the world's money, statistics of gold and silver, etc., By R. P. ROTHWELL. cloth..... 75c.

The Electric Transmission of Intelligence. By PROF. E. J. HOUSTON. And other Advanced Primers of Electricity. 88 illustrations. 12mo, cloth..... \$1.00

SENT, POST-PAID, ON RECEIPT OF PRICE BY

DAVID WILLIAMS, Publisher and Bookseller, 96-102 Reade St., N. Y



THE ECONOMIC HOPKING ROLL PAPER CUTTER.

Made in all sizes, 6 to 36 inches, at \$1.50 each Japan and Hardwood Finish.

Made by the

American Roll Paper Co.,
St. Louis, Mo.

IF YOU WANT A NIAGARA DYNAMO OR MOTOR

or if you are a dealer and want an Agency send for our Catalogue and Price-List.

LOVELL MFG. CO., LTD., ERIE, PA.

KEEP BOOKS

by WEST'S New Original-ENTRY LEDGER. Make the same entry but once. A Ledger in place of a full set of books. Convenient forms for all entries. Easily applied, simple, saves time. West's Self-Proving Balance locates every error. Send 8 2-cent Stamps for illustrated 16-page pamphlet.

WOLCOTT & WEST, Syracuse, N. Y.



NICKLE, Silver and Bronze Metallic Figures and Letters, Sizes 1/4 in to 3 in. Pattern Letters, Steel Stamps, Brands, Dies &c. Send for Reduced Price List. We make a specialty of the Hardware Trade.
A. A. WHITE & CO., Providence, R.I.

B & O. SURE GRIP TIRE UPSETTER.

Size.	Capacity.	List Price.
No. 1.	3 x 1/2 and smaller,	\$20.00
No. 2.	4 x 1 "	30.00

IT IS WITHOUT A FAULT. ONE MOTION DOES IT ALL.

Every machine is tested and warranted to give satisfaction. We confidently offer this upsetter as the best to be had.

BUTTS & ORDWAY,

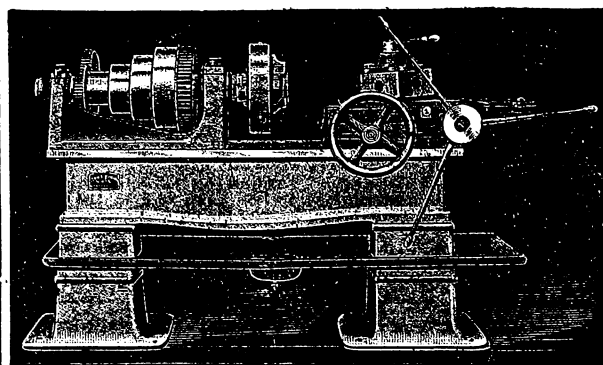
MANUFACTURERS,

500 Atlantic Avenue,
BOSTON.

ALSO DEALERS IN

Heavy Hardware.
Iron and Steel.
Carriage and Wagon Wheels.
Contractors' Supplies.

— SEND FOR CATALOGUE. —



TURRET
MACHINES
LATHES,
MILLING
MACHINES,
SPECIAL
MACHINERY.

JOHN L. BOGERT, FLUSHING, N. Y.

BEFORE YOU ORDER AND SUBSCRIBE TO YOUR

FOREIGN PERIODICALS

FOR NEXT YEAR, PLEASE SEND FOR ESTIMATE TO

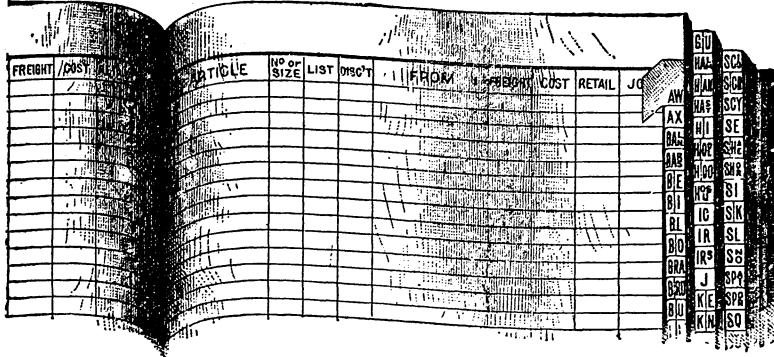
GUSTAV E. STECHERT, 810 Broadway, New York

IMPORTER OF BOOKS AND PERIODICALS.

BRANCHES AT LEIPZIG, LONDON, PARIS.

The Iron Age Hardware Price Book E.

SECOND EDITION, REVISED AND ENLARGED, WITH MULTIPLE INDEX (Patent Pending).



AD GU SC
AN HA^L SCR
AU HAN SCY
AW HA^S SE
AX HI SH^E
BA^N HO^L SH^R
BA^S HOO SI
BE HQ^S SK

Fac-Simile of Indexing.

SIZE.—The book is 7 x 10 inches (much larger than Price Books A, B, C, or D), 350 pages.

PAPER.—The paper is the celebrated Crane's heavy ledger paper, tough and strong, permitting frequent changes and erasures.

BINDING.—The binding is of the very best quality—flexible seal grained leather.

INDEX.—By means of the arrangement shown in the cut the index applies to every page (except Supplement) and permits reference to any article at a single motion. This greatly facilitates the use of the book, avoiding the troublesome turning from page to page which is necessary in connection with other Price Books. It has been prepared with great care, and it is believed that it provides a place for every article in the Hardware line.

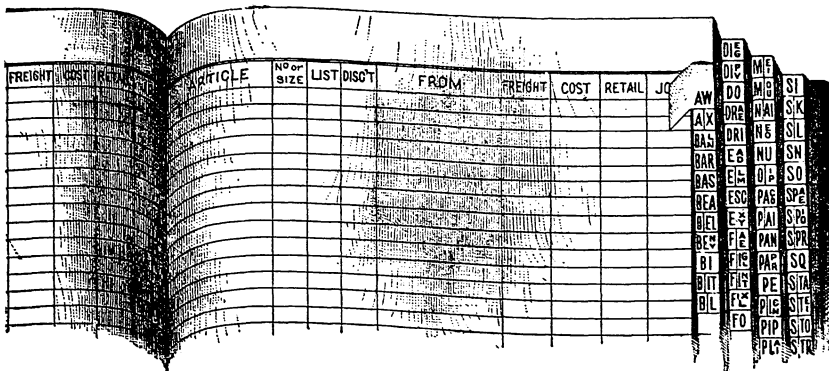
ARRANGEMENT.—The book is arranged to keep a complete record of prices on a single page, the width giving sufficient room.

SUPPLEMENT.—A 40-page Supplement is provided to give room for supplemental quotations, memoranda, tables, &c.

THIS BOOK IS ISSUED IN ONLY ONE EDITION, PRICE, \$5.00.

The Iron Age Hardware Price Book F.

WITH MULTIPLE INDEX (Patent Pending).



AD DI^E M^F SI
AN DI^P M^O SK
AU DO NAI SL
AW DR^E N^O SN
AX DRI NU SO
BA^N E^A O^P SP^E
BAR E^M PA^O SP^O
BAS ESC PAI SPR

Fac-Simile of Indexing.

SIZE.—The book is 8 1/4 x 11 inches (much larger than Price Books A, B, C, D or E), 556 pages.

PAPER.—The paper is the celebrated Crane's heavy ledger paper, tough and strong, permitting frequent changes and erasures.

BINDING.—The binding is of the very best quality—flexible seal grained leather.

INDEX.—By means of the arrangement shown in the cut the four rows of index applies to every page (except Supplement) and permits reference to any article at a single motion. This greatly facilitates the use of the book, avoiding the troublesome turning from page to page which is necessary in connection with other Price Books. It has been prepared with great care, and it is believed that it provides a place for every article in the Hardware line, and gives ample space for recording prices.

Sufficient space has been provided for large lines of goods such as Axes, Bits, Springs, etc., by allowing four pages to such indices, instead of two pages, as for lines of goods requiring less space. This is accomplished, as in AX for example, in Book F by having a short tab with the letter A on the tab on the first leaf, and AX on the tab on the second leaf. The A on the first leaf is directly over the A on the lower leaf, so that the index reads AX whether looking at both leaves together, or at the lower one only.

The four rows of index tabs are printed in gold letters on black Russia leather. The tabs are securely fastened on both sides of each page, making a handsome and durable index.

ARRANGEMENT.—The book is arranged to keep a complete record of prices on a single page, the width giving sufficient room.

SUPPLEMENT.—An 80-page Supplement is provided to give room for supplemental quotations, memoranda, tables, &c.

THIS BOOK IS ISSUED IN ONLY ONE EDITION, PRICE, \$7.50.

Advantages of Multiple Index Price Book.

A SPECIAL feature of the books is the arrangement of the index characters, which, instead of being alphabetical, are arranged with special reference to the classification of Hardware goods, each index character giving the first two or three letters of the names of Hardware articles as shown above. The ease and convenience with which the books can be used is indicated in the following examples, taken from Book F:

For Augers,	turn to	AU	For Chisels,	turn to	CH	For Iron,	turn to	IRO
" Parers, Apple	"	PA ^R	" Cutlery,	"	CUT	" Irons,	"	IR ^S
" Saws,	"	SAW	" Cartridges,	"	CAR	" Shovels,	"	SH ^O
" Pumps,	"	PUM ^N	" Rules,	"	RU ^L	" Grindstones,	"	GRI
" Bits,	"	BIT	" Locks,	"	LO	" Stones,	"	STO

Special care has been taken to make the classification as indicated in the index correct and comprehensive, making provision for all Hardware articles and giving sufficient space for the keeping and recording of prices. It is thought that every strictly Hardware article has its first two or three letters given, thus permitting immediate reference to it by a single motion.

It is, however, obvious if any articles are not directly designated by the index characters, that the index, being alphabetical in its arrangement, indicates the place where quotations on such articles should be recorded. The supplement, however, may be found useful for quotations on any outside goods which the Hardwareman may desire to keep prices on, while at the same time it may be used if necessary for any overflow of matter from the preceding pages, or to contain list prices or other matter relating to goods.

Hardware Classification.—A pamphlet containing a classification of the leading Hardware articles is furnished with the price books.

Standard Lists.—In connection with these price books a set of *The Iron Age* STANDARD HARDWARE LISTS can be used with great advantage. Price 25 cents.

These price books, which have been prepared by R. R. Williams, Hardware Editor of *The Iron Age*, are presented to the attention of Hardware men in the confidence that they will be found a most valuable aid in keeping track of prices.

Sent, Post-paid, on Receipt of Price, by

DAVID WILLIAMS, Publisher, - 96-102 Reade St., New York.

F

Hosted by Google

THE STEEL AND IRON IMPROVEMENT CO.,

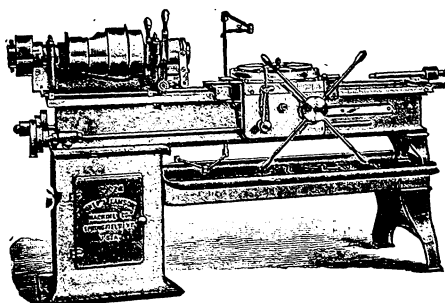
Controlling the Adams-Blair Process and other Steel and Iron Patents.

High Grade Open Hearth Steel produced by the Adams-Blair Process at less than the Cost of BESSEMER Steel.

91 and 98 Fifth Ave., Pittsburgh, Pa.

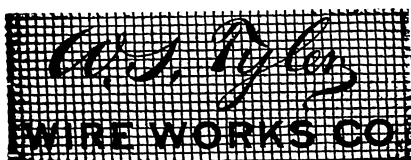
EASTERN OFFICE: 412 Drexel Building, Philadelphia, Pa.

HAVE YOU A
FLAT TURRET LATHE ?



If not send for

RAPID LATHE WORK.
JONES & LAMSON MACHINE CO.,
SPRINGFIELD, VT., U. S. A.



MANUFACTURERS OF

Improved Revolving Mining Screens,

For Coal, Ores, Phosphates, Etc.

Also Tipple Screens and Yard Screens. Extra Heavy Double Crimped Mining Cloths, of every description.

W. S. TYLER, Pres. PROCTOR PATTERSON, Sec. and Treas.
CLEVELAND, OHIO.

ANALYTICAL AND ASSAY **LABORATORIES**

—OF—

DR. GIDEON E. MOORE

221 PEARL ST., (Corner Platt St.) NEW YORK.

Assays of Ores, Metals and Metallurgical Products of every description.

Analysis of Water, Ores, Minerals, Metals, Fuel, and Natural and Industrial Products generally.

PRINTED PRICE-LIST ON APPLICATION.

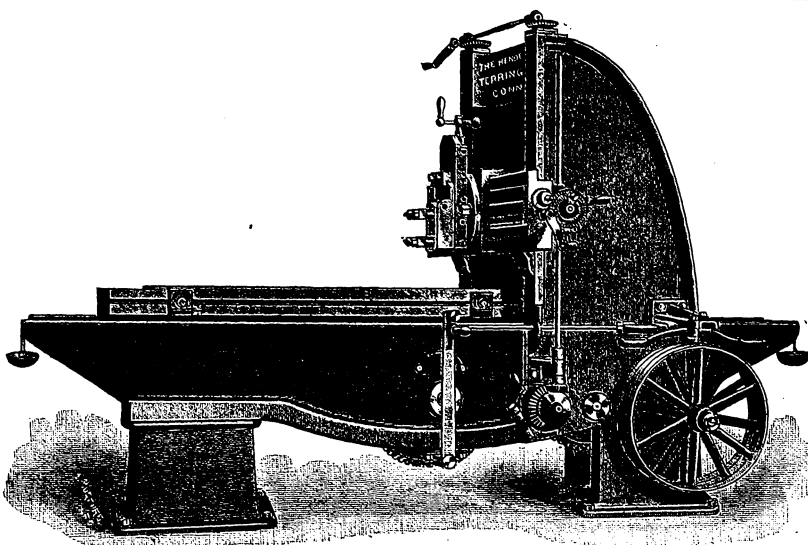
ALUMINUM.

The Pittsburgh Reduction Co.,

116 Water St., Pittsburgh, Pa.,

Offer Aluminum guaranteed equal in purity to the best in the market, at lowest rates obtainable.

ALUMINUM SHEET, WIRE,
AND CASTINGS.



Iron Planers at Reduced Prices.

We have on hand a few new planers of this pattern, and in order to dispose of them quickly, we would make a good reduction in price of same. The sizes are 16 inch, 22 inch, 24 inch and 27 inch. If you are in need of a good planer write us for prices on these.

The Hendey Machine Co., Torrington, Conn.

DO YOU NEED

SPECIAL MACHINERY?

CORRESPOND WITH

THE NEWARK MACHINE TOOL WORKS,

NEWARK, N. J.



THE WHEEL
OF
FORTUNE.

— — — —
The Stearns.

E. C. Stearns & Co., = Syracuse, N. Y.

ARE YOU HERE TO MAKE MONEY?

IF SO, THE PRICES WE ARE MAKING ON
OIL HEATERS AND GAS STOVES
WILL INTEREST YOU.

B. & B. Stoves are the Leaders.

B. & B. Combination Oil Heaters and Cook Stoves are a great success, as proven by the many testimonials received from all parts of the country.

Every Stove is mounted on rollers, and can easily be moved from room to room. They can be used in place of a range in the kitchen or in place of a base-burner in the parlor. They are thoroughly well adapted to fill all requirements, combining as they do all the qualities of a first-class Oil Heater and an elegant Parlor Cook Stove.

If you happen to have one of them upstairs, the tank can easily be removed and taken down to the kitchen to be filled, and again replaced in the Stove.

Those who have used the old style Stove with tanks fastened in them as tight as if cast in the iron will appreciate this feature. They can be fitted with our 2-hole, 3-hole or 4-hole Extension Tops for regular 8-inch ware. We want your trade, and if you will give us a chance to quote you prices we will have it.



ASK FOR OUR NEW 80-PAGE CATALOGUE.

W. W. MONTAGUE & CO., San Francisco, General Agents for the Pacific Coast.

The Glazier Stove Co., Mfrs., CHELSEA, MICH.



The standard by which the merits of a Freezer are gauged is, how near it comes to being as perfect as the

WHITE MOUNTAIN ICE CREAM FREEZER.

It always has been, and is still, the best. Try them.

Manufactured by The White Mountain Freezer Co., Nashua, N. H.



THE OLD RELIABLE STANDARD FREEZER

has the reputation of being the BEST ICE CREAM FREEZER ever introduced. STRENGTH, DURABILITY, NEATNESS AND EFFICIENCY are prominent points in the manufacture. Full Size Can, CEDAR TUB, Detachable Hinged Crossbar, Self-adjusting Vibratory Scraper, etc. Write for Illustrated Circular, Price-List and Discounts of STANDARD, GOOD LUCK, MODEL and MACHINE Freezers.

CHAS. W. PACKER, Mfr.,
20 North Fourth Street, Philadelphia.

THE "New" Keystone Beater,

No. 20 for Family Use.

JAR ENTIRELY COVERED.

No more Spattering.

CAN BE USED ANYWHERE.

Standing or Sitting.

ALWAYS READY FOR USE.

Nothing to be fixed.

SIMPLY PERFECT.

No. 20.—Jar holds 1 quart level full.
Complete Machine securely packed in one single package.
½ dozen packed in case.

MANUFACTURED ONLY BY

NORTH BROS. MFG. CO.,

Manufacturers of Hardware Specialties for Household use
American St. and Lehigh Ave., Philadelphia, Pa., U. S. A.



FOR
WHIPPING
AND
BEATING
EGGS.
MIXING
BATTERS, DRINKS,
SAUCES, ICINGS,
POWDERS, ETC.
CREAMING
MELLOW FRUITS,
BANANAS, PEACHES,
BERRIES,
BUTTER & SUGAR.

Agents Wanted. **30 POUND SYLPH.** Strongest Cycle of its weight on the market. Guaranteed highest grade, and built for scorchers and hard road riders. By using tubular hubs, front fork, saddle post, etc., we do away with forgings and use heavier tubing. Our system of lap-brazing makes joints as strong as any part of the tubing, and thus we get a lighter and by far stronger machine. Investigate. Catalogue free. **R. OUSE-DURYEA CYCLE CO., 146 G St., Peoria, Ill.**

COVERT'S SELF-LOCKING, GATE AND DOOR HOOK.
POSITIVELY PREVENTS BEING UNHOOKED FROM THE OPPOSITE SIDE THROUGH CRACK OR NARROW OPENING
MADE IN TWO SIZES
4 AND 6 INCH XC PLATED.
SAMPLE BY MAIL 15¢

Call for Our Banner Bolt Snap:

This snap has many important advantages over other makes of Bolt Snaps, viz.: It is lighter, the spring is entirely covered and protected from foreign substance and freezing, and is lower in price.

Made in all sizes; Round, Loop and Open Eye. We are headquarters and the most extensive manufacturers in Saddlery, Coach and General Hardware Specialties.

Covert's Saddlery Works,

FARMER, N. Y., U. S. A.

Electric Toy Making, Dynamo Building and Electric-Motor Construction. By T. O'CONOR SLOAN, A.M., E.M., Ph.D. This work treats of the making at home of electrical toys, electrical apparatus, motors, dynamos, and instruments in general and is designed to bring within the reach of young and old the manufacture of genuine and useful electrical appliances. The work is specially designed for amateurs and young folks. Very fully illustrated. \$1.00

For sale by David Williams, 96-102 Reade St., N. Y.

Hardware Dealers Can Profitably SELL BICYCLES.

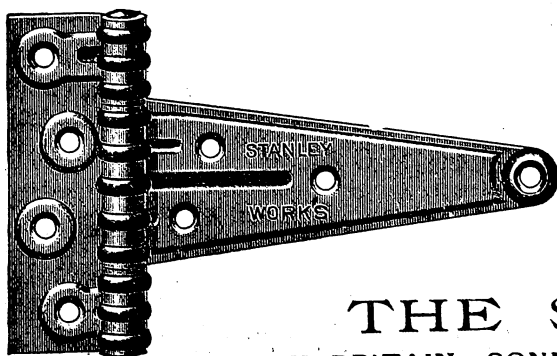
There is a large trade in Bicycles in all parts of the country and much of that trade naturally belongs to dealers in hardware. Good bicycles meet with a ready sale and pay a fair percentage of profit.

COLUMBIAS

Are the representative high grade machines in America. A Columbia is the easiest machine to sell to the best trade because it is unquestionably the standard wheel of the world.

We want enterprising agents of good standing and solicit correspondence.

Pope Mfg. Co.,
221 Columbus Ave.,
Boston, Mass.



"Once tried
Always bought."

Stanley's Corrugated Steel Hinges.

If your jobber does not handle them send us his name and address and get some valuable "Pointers" Free.

THE STANLEY WORKS,

NEW BRITAIN, CONN.

79 CHAMBERS ST., NEW YORK.

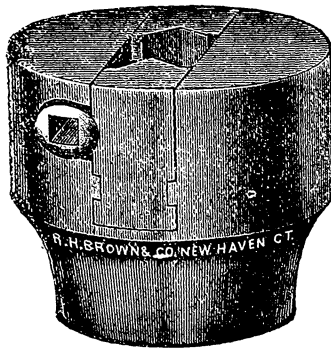
REID DRILL CHUCKS.

THREE SIZES.

No. 0 takes any drill from 0 to 1-2 inch inclusive.

No. 1 " " " " 0 " 3-4 " "

No. 2 " " " " 0 " 1 " "



They are the strongest and most durable made. Drill absolutely in the center. No twisting or bending necessary if drill is straight. Can be fitted to hollow spindle lathes for working long rods.

SEND FOR CIRCULAR.

R. H. BROWN & CO., - New Haven, Conn.

*You take no risk on the quality
We make only the best!*



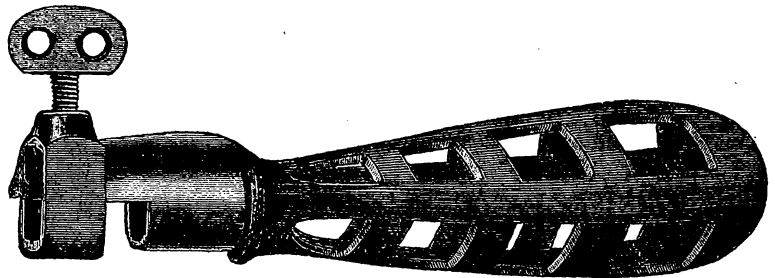
**Sand
Papers**
IN
Reams and Roll

Flint Paper
Garnet Paper
Emery Paper
Emery Cloth

HAIR FELTING for covering Boilers, Steam and Water Pipe, and lining Refrigerators.

BAEDER, ADAMSON & CO.

730 MARKET STREET, PHILADELPHIA.
87 BECKMAN STREET, NEW YORK.
143 MILK STREET, BOSTON.
162 LAKE STREET, CHICAGO



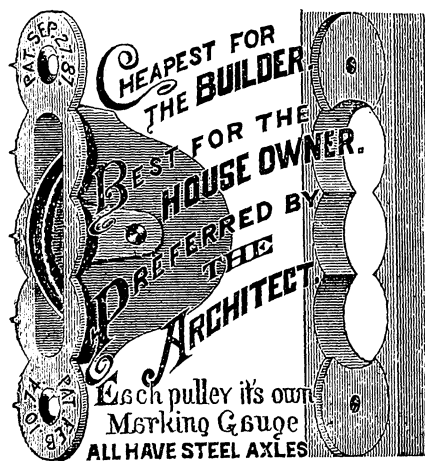
UNIVERSAL FILE HANDLE.

This malleable iron File Handle is five inches long and has a Japan finish. The Thumb Screw, as seen in the cut, is forged steel. Weight of handle five ounces. It is strong, durable, and will hold perfectly files of all size and shape tangs from a 15 inch mill file to the smallest size in use. It will hold equally well Twist Drills, Gimlets, Screw Drivers, Auger Bits, and all tools with shanks less than $\frac{3}{8}$ of an inch square.

It will also answer most of the purposes of a Hand-Vise, and will sell at sight anywhere Price, per dozen, \$1.80.

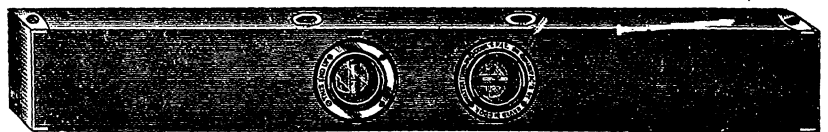
MILLERS FALLS CO.,
93 READE ST., NEW YORK.

Palmer's Common Sense Frame Pulley.



MANUFACTURED BY

PALMER HARDWARE MFG. CO., Troy, N. Y.



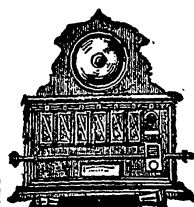
**COOK'S
PATENT
LEVEL.**

Made in Wood and Iron. Every Level Fully Guaranteed.

Inquire at your nearest hardware store for them. If not in stock, send to

TAKE NO
OTHER.

DAVIS & COOK,
WATERTOWN, N. Y.



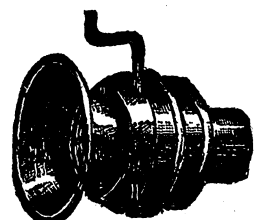
W. R. OSTRANDER & CO.,

204 FULTON STREET, NEW YORK,

Manufacturers of

SPEAKING TUBES, WHISTLES, ORAL, ELECTRIC
MECHANICAL AND PNEUMATIC ANNUNCIATORS
AND BELLS.

Complete outfits of Speaking Tubes, Whistles
Electric, Mechanical and Pneumatic Bells. A full line
always in stock. Send for new catalogue. Factory,
DeKalb ave. near Knickerbocker Brooklyn, N. Y.



CABINET LOCKS

OF EVERY KIND.

DRAWER LOCKS,

CUPBOARD LOCKS,

WARDROBE LOCKS,

CHEST LOCKS

DESK LOCKS.

A complete line of more than 1000 list numbers exclusive of our old and complete line of

YALE CABINET LOCKS.

THE YALE & TOWNE M'F'G CO.,

STAMFORD, CONNECTICUT.

New York. Chicago. Philadelphia. Boston. Pittsburg. San Francisco.

THE DEALER who sells what
THE PEOPLE ask for.

MAKES FRIENDS and MONEY, and
SAVES TIME and TROUBLE.

The people ask for

LePage's Liquid Glue,

And the people are right.

It is the strongest and best glue made. It has been imitated, but never equalled. Be sure to get what you order and ACCEPT NO SUBSTITUTES.

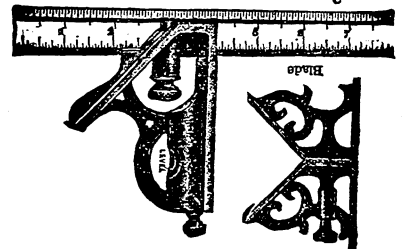
Our name is on every label

RUSSIA CEMENT CO.,

GLOUCESTER, MASS.

New York Office, 95 Reade and 113 Chambers Streets.
Pacific Coast Office, 23 Davis Street, San Francisco, Cal.

CHAPLIN TRY AND CENTRE SQUARE.



Also a full line of

MACHINISTS' FINE TOOLS.

If you haven't our 1893 catalog send us a postal card.

STANDARD TOOL CO.,

ATHOL, MASS., U. S. A.

ATHOL MACHINE CO., Selling Agents.

NONPAREIL Ratchet Wrenches.

Made of best forged Tool Steel; are easily and readily adjusted and controlled. Can be made reversible instantly without removing from their work by throwing over the lever in slot of the handle.

The Set of Combination Tools No. 1 includes the wrench, two sockets, one for screw-driver, bit or reamer shank, with wood handle, and one socket



for drill shank and feed nut. The jaws on this wrench open from 3-16 to 1 1/4 inches.

Send for Illustrated Circular and Price-list of various sizes

The Keystone Mfg. Co.
312 Terrace, Buffalo, N. Y.

DOST THOU LOVE LIFE?

THEN DO NOT SQUANDER

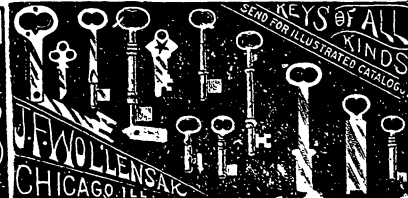
TIME

FOR THAT'S THE STUFF

LIFE IS MADE OF



SAVE TIME TROUBLE AND CASH
BY USING
BARLOW'S PAT. MANIFOLD
SHIPPING BLANKS
BARLOW BROS., GRAND RAPIDS, MICH.



W. & B. DOUGLAS, MIDDLETOWN, CONN.

Branch Warehouses: 85 and 87 John St., New York; 197 Lake Street, Chicago, Ill.

THE OLDEST AND MOST EXTENSIVE MANUFACTURERS OF

Pumps, Hydraulic Rams, Garden Engines,

Yard Hydrants, Street Washers, Galvanized Pump Chain, Wind Mill Pumps and other Hydraulic Machines in the World.

DOUGLAS' DIAPHRAGM PUMPS, "Loud Patent."

A LARGE CAPACITY AND EASY WORKING PUMP FOR

Water Works, Sewer Contractors, Foundation Builders, Mines, Quarries,

Fig. 209.

Fig. 381.

Fig. 145.

or wherever it is desired to raise a large quantity of water by
hand power.

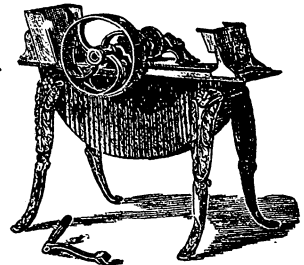
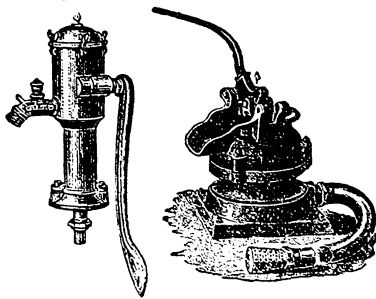
The pump has large valves (accessible by hand), and will pump water containing sand, gravel, sewage matter, &c., without choking or any perceptible wear.

CAPACITY

from 3,000 to 4,500 gallons per hour.

These pumps are simple, durable and low priced.
Made either as shown in cut for Hose or for IRON Pipe Suction underneath.

Send for Circular and Price List.



C. I. Grindstone Frame.

THE DEMING
FACTORY
SALEM, U.S.A.
MANUFACTURERS OF
HAND PUMPS, WELLS, SUPPLIES & C. VERTICAL STEAM PUMPING ENGINES
ARTESIAN CYLINDERS, HYDRAULIC RAMS
N.Y. OFFICE: 72 JOHN ST.
HENION & HUBBELL
GEN'L. WESTERN AGT.
35 & 57, N. CLINTON ST.
CHICAGO, ILL.

F.E. MYERS & BRO.



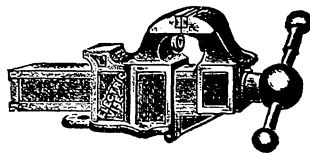
Ashland Pump and Hay Tool Works.

The New York Safety Dumb Waiter,
"The Manhattan Dumb Waiter,"
"The Improved Humphrey Hand Elevator,"
Made specially to be sold by Hardware Stores, Thousands in use. Catalogues on application.
THE STORM MANUFACTURING CO.
NEWARK, NEW JERSEY.
Formerly of Poughkeepsie, New York.

VISE.

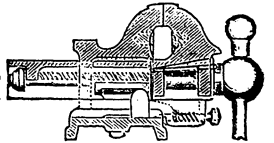
Patented Dec. 27, 1892.

IT HAS QUALITIES THAT ARE UNDISPUTED.

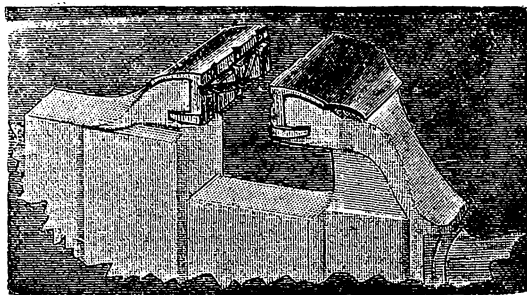


Rapid, Active, Prompt

One movement in and out, one turn of the hand and the work is secured.



The Capital Machine Tool Co., AUBURN, N. Y.



BINGHAM PATENT VISE JAW CAP

Will Fit any Kind of Vise.

For protecting finished work. Will hold finished rods of any shape without injury.

3 1/4 inch..... per pair, 40 cents.
4 " " " " 50 "
4 1/2 " " " " 80 "

PRENTISS VISE CO.

= 44 Barclay St., New York.

'NOT TOO NEW, BUT JUST NEW ENOUGH!'

TESTED BY SEVERAL YEARS OF POPULARITY WITH THE TRADE.

SAVES

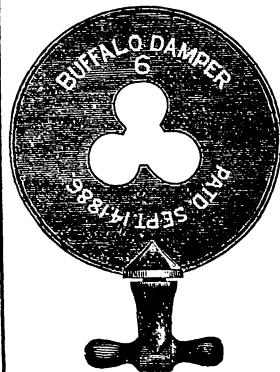
TIME AND TEMPER.

SIMPLE,

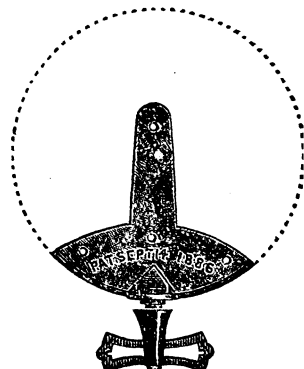
SINGLE BEARING,

EASILY PUT IN.

ONLY ONE HOLE IN PIPE.



THE BUFFALO DAMPER.



THE BUFFALO DAMPER CLIP.

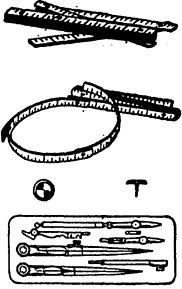
THE BUFFALO DAMPER CLIP IS

BETTER THAN THE NEWEST AND AS CHEAP.

ALL DAMPERS or DAMPER CLIPS supplied with wood or metal handles, as desired
—SOLE MANUFACTURERS,—

SIDNEY SHEPARD & CO., C. SIDNEY SHEPARD & CO.
BUFFALO, N. Y. CHICAGO, ILL.

SAMPLE ORDERS SOLICITED.

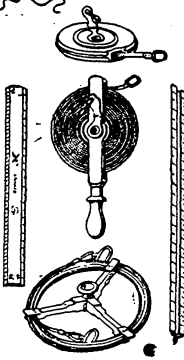


KEUFFEL & ESSER CO.

NEW YORK.
BRANCH: CHICAGO.
• FACTORIES: HOBOKEN, N.J.

MANUFACTURERS OF EXCELSIOR MEASURING TAPES.
SUPERIOR QUALITY, LATEST IMPROVED. GREATEST VARIETY.
STEEL • METALLIC • LINEN • POCKET TAPES.
EXCELSIOR BAND CHAINS FOR SURVEYORS; LAND CHAINS, &c.
K & E CO FOLDING POCKET RULES.
NO WARPING, NO SHRINKING, NO ILLEGIBLE JOINTS, NO BULK.
2 3.4 5.6 8 FOOT, ALSO WITH PATENT SPRINGS.
FLAT & TRIANGULAR BOXWOOD SCALES, BEST MADE.
PLUMB BOBS, THUMB TACKS, DRAWING INSTRUMENTS.

PRICE LISTS & QUOTATIONS PROMPTLY SENT.



HIGHEST GRADE PLATED WARE MADE.

THE MAJESTIC.

Design Patented August 29th, 1893.



All our goods Sectional Plated on parts most exposed to wear.

Branch Offices:

19 Murray St.,
New York.
110 & 112 Wabash
Ave., Chicago.
722 Chestnut St.,
Philadelphia.
133 Charles St.,
Baltimore.
120 Sutter St.,
San Francisco.

The Rogers and Hamilton Co., Factories and Main Office, WATERBURY, CONN.
FOR SALE BY ALL THE LEADING JOBBERS.

IRON INSTEAD OF WOOD.
GALVANIZED IRON
TUBING and CURB,
— FOR —
CHAIN PUMPS,
(Kegler's Patent)
Are Giving Universal Satisfaction,
BECAUSE:



They do not rust and accumulate filth—always clean. Extreme lightness is combined with strength and durability. No freezing. No waste of water by reason of enlarged reservoir at top of tubing. No annoying wheel at bottom. Easy to handle.
Tubing weighs less than 1/2 lb. per ft., is connected by couplings and can be attached to any make of curb.

Send for Catalogue.
Bellevue Pump Co., Bellevue, Iowa.

"RELIABLE"
Steel Measuring Tapes.



Entirely new. Handle or crank when closed is perfectly flush with leather case. Opens by pressing button on opposite side and folds out double, giving increased leverage. Best and most convenient steel tape on the market. Fully guaranteed. Will send samples on approval. We carry a complete stock of our goods at our New York Office, 20 Murray St.

LUFKIN RULE CO., Saginaw, Mich.

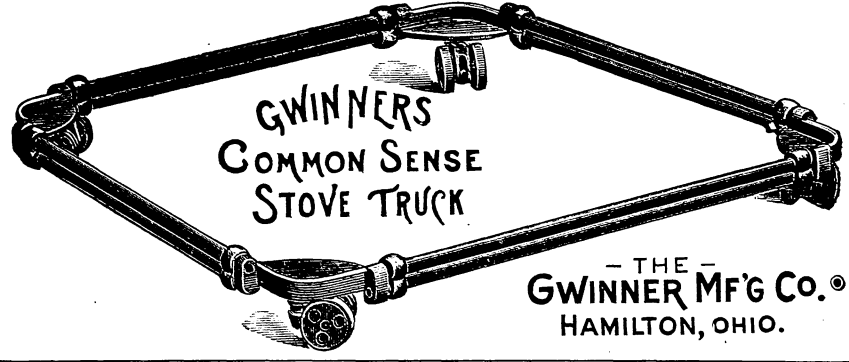
COLUMBIA STEELWIND MILL
New in Principle.
Beautiful in Appearance.
Powerful in Operation.



Contains covered Internal Gear. Unequaled in the line of Pumping Wind Mills. We solicit the closest investigation. Also Columbia Steel Derricks, Iron Turbine Wind Engines, Buckeye Force & Lift Pumps, Tank and Spray Pumps, Buckeye and Globe Lawn Mowers, Iron Fencing, Cresting, Etc. Write for circulars.

MAST, FOOS & CO., SPRINGFIELD, O.

WINNERS COMMON SENSE STOVE TRUCK



— THE —
GWINNER MFG CO.®
HAMILTON, OHIO.

BERGER BROS.
Manufacturers of
TINNERS' HARDWARE.
Berger's Celebrated Pail Bars, Sauce Pan Handles, Eave Trough Hangers, Pipe Fasteners, Hooks, Straps and Barrel Trucks, &c., &c. Send for Prices and Catalogue.



237 ARCH ST.,
Philadelphia, Pa.

GASOLINE & OIL



TORCHES.

TINNERS' & PLUMBERS



FURNACES.

PAINT



BURNERS.

THE DANGLER STOVE & MFG. CO., CLEVELAND, O.

IMPROVED EDITION OF THE IRON AGE HARDWARE PRICE BOOKS.

Arranged by R. R. WILLIAMS, Hardware Editor of the Iron Age.

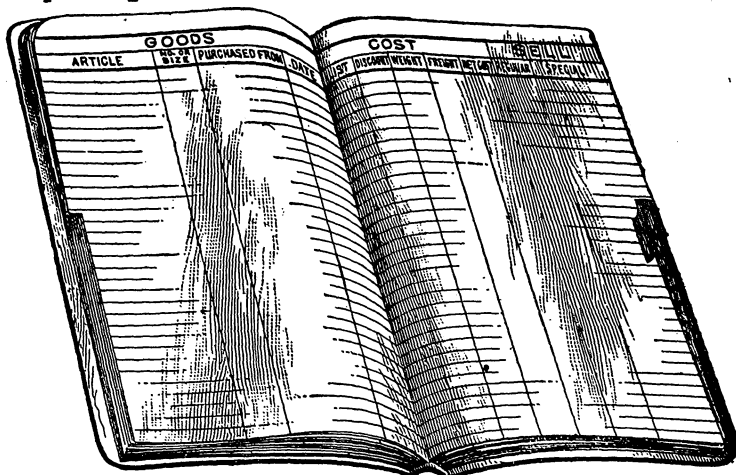
These Books are printed on paper of superior quality and bound in grain seal leather.

Columns are provided for the name and number or size, for noting from whom purchased, date of quotation or purchase, list and discount, and for entering freight expenses as an element of cost. Under the heading of selling prices, the regular and any special price, or remarks in regard to the goods are given place. This book goes into considerable detail in describing the goods and cost prices. It has been arranged in accordance with the views of many Hardwaremen whose methods are careful and exact.

Size, 4 x 7 in.; grain seal leather.

FOUR EDITIONS:

A, 200 pages,	-	-	-	-	-	\$1.00
A F, 200 pages with flap,	-	-	-	-	-	1.25
A 2, 400 pages,	-	-	-	-	-	1.50
A F 2, 400 pages with flap,	-	-	-	-	-	1.75



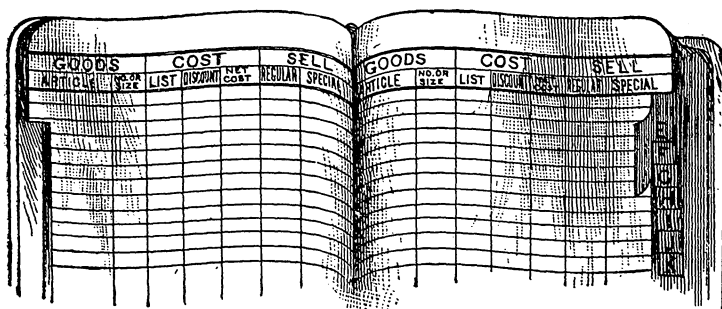
Hardware Price Book A.

In this book each page is complete, and the record of prices does not, as in Book A, run across two pages. Thus it accommodates a larger range of goods with much less detail in the record. It is adapted for office or store use, and by the use of familiar abbreviations, sufficiently large for the convenient and concise record of prices.

Size, 4 x 7 in.; grain seal leather.

FOUR EDITIONS:

B, 200 pages	-	-	-	-	-	\$1.00
B F, 200 pages with flap,	-	-	-	-	-	1.25
B 2, 400 pages,	-	-	-	-	-	1.50
B F 2, 400 pages with flap,	-	-	-	-	-	1.75



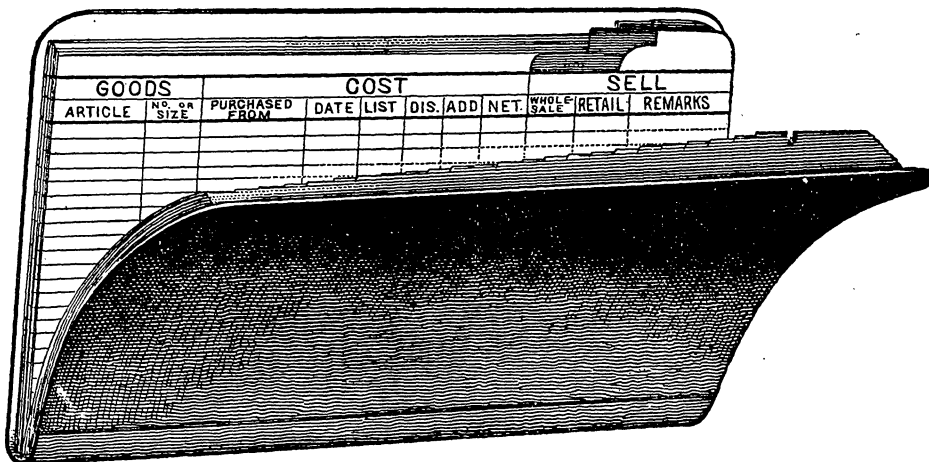
Hardware Price Book B.

The headings in Book C run across the top, in a line parallel with the hinge. In this way a very complete record can be kept on a single page. The details of weight and freight contained in Book A are omitted, and a single column headed "Add" given for the insertion of freight or other expenses which it is desirable to include in the cost. Under the selling prices space is left for the wholesale price, the retail price, and also for any remarks in regard to cost of the goods, desirability of pushing them, or other matters.

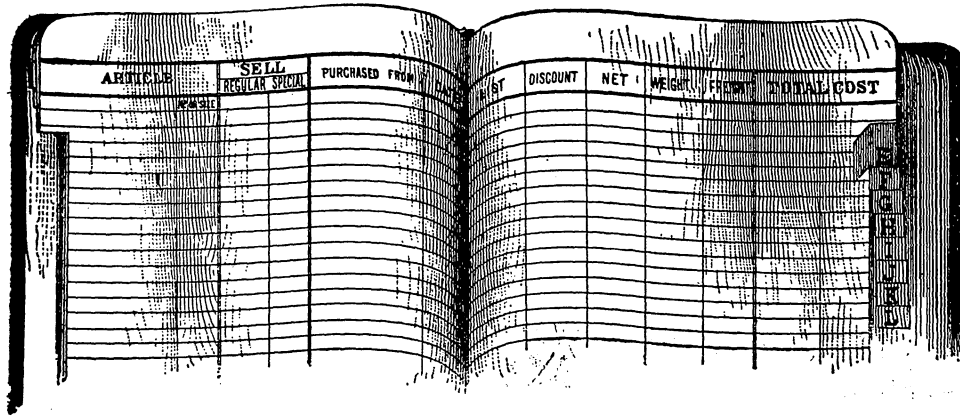
Size, 4½ x 7½ in.; grain seal leather.

FOUR EDITIONS.

C, 200 pages,	-	-	\$1.00
C F, 200 pages with flap,	-	-	1.25
C 2, 400 pages,	-	-	1.50
C F 2, 400 pages with flap,	-	-	1.75



Hardware Price Book C.



Hardware Price Book D.

Arrangement is adapted to the requirements of the trade in this direction.

Size 5¼ x 8 in.; grain seal leather.

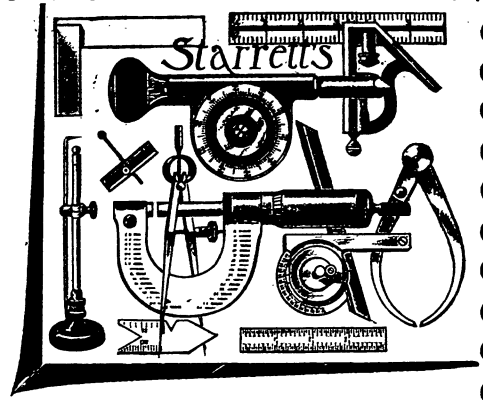
FOUR EDITIONS.	D, 200 pages,	-	-	-	\$2.00	D 2, 400 pages,	-	-	-	\$3.00
	D F, 200 pages, with flap,	-	-	-	2.50	D F 2, 400 pages, with flap,	-	-	-	3.50

Price Book D will recommend itself particularly for desk and store use, and for salesmen on the road.

The name of the article, its number or size and the selling price are the first to meet the eye on the left-hand page, as embodying information desired when the selling price is required. The other headings follow in convenient order, by which a detailed memorandum regarding the goods may be kept, the whole being seen at a glance. A number of pages at the back of the book are arranged for memoranda, which will be found a great convenience. This arrangement

Sent, post-paid, on receipt of price by **DAVID WILLIAMS, Publisher, 96-102 Reade St., New York.**

Do
you
want



BUSINESS?

Put in a line of **FINE MECHANICAL TOOLS**. Push them. Display them in your windows. Advertise them. Make yourself and your salesmen familiar with their strong points. Show them up to every mechanic who comes into your store.

As long as there is anything made, mechanics must have tools. The best mechanics want the best tools. They want **STARRETT'S**.

Starrett's tools are not experiments. They are standards. Every tool is warranted accurate and first class in every particular. Best in workmanship, finest in finish, latest in improvements.

It is the best line of Fine Tools for live hardware dealers to handle. Gives "tone" to a store. Makes regular customers. Pays a good profit.

Send for Catalogue and prices.

A new Catalogue, 70 pages, is now being printed, and will show a number of new tools and improvements. Shall I send you one?

An electrotype of a group of tools, as shown above, will be mailed free to any hardware dealer who will use it.

L. S. Starrett,

Athol, Mass., U. S. A.

GEO. N. CLEMSON, Pres.

LOUIS DUHME, Vice-Pres.

ROBERT J. JOHNSON, Treas.

F. B. EARLE, Sec.

The National Saw Co.,

OPERATING

Wheeler, Madden & Clemson Mfg. Co., Middletown, N. Y. Woodrough & McParlin, Cincinnati, O. Woodrough & Clemson, Boston, Mass. Monbagen Steel Works, Middletown, N. Y. Richardson Brothers, Newark, N. J. Harvey W. Peace Co., Brooklyn, N. Y. Pennsylvania Saw Co., Philadelphia, Pa.

GENERAL OFFICE

96 & 98 READE ST.,

NEW YORK.

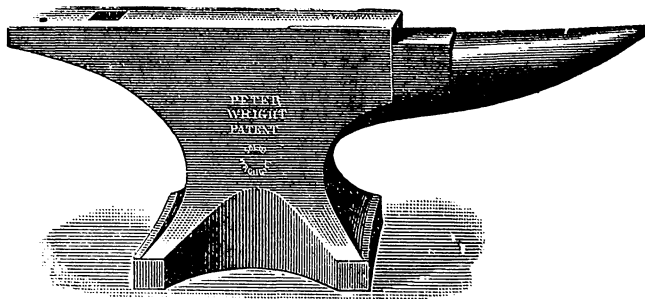
SAWS

Peter Wright's Patent Solid Wrought Anvil

PETER
WRIGHT
PATENT

SOLID
WROUGHT

Fac-Simile of Trade-Mark.



Fac-Simile of Green Label.

By Royal Letters Patent.

V. R.

PETER WRIGHT'S
SOLID WROUGHT
ANVIL
Made of Best Scrap Iron!
THE BICK FACE AND END ALL
IN ONE SOLID PIECE!

You are cautioned in buying to see that each anvil is stamped with the full trade-mark on one side and has the green label affixed to the other.

PETER WRIGHT & SONS, Dudley, England.

CIRCULAR,
BUTCHER,BAND,
BUCK

SAWS

—MANUFACTURED BY—

C. A. HILES & CO.,

336-338 Carroll Ave. CHICAGO.

BUSINESS ESTABLISHED
1798.INCORPORATED
1891.

JOS. F. McCOY CO.,

26 Warren St., New York,

Headquarters for

Coates' Horse Clipper

AND

Barber

Clippers.

ALSO

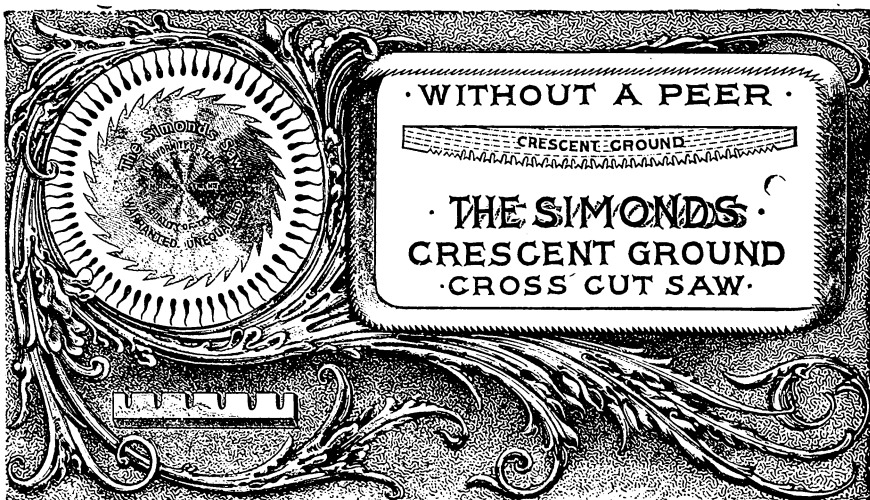
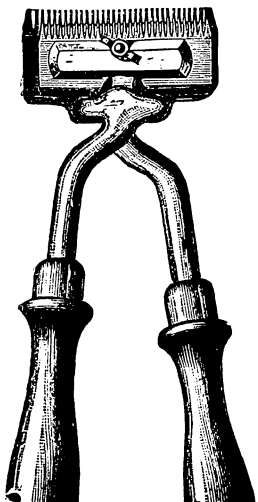
THE "BELL"

AND

THE "COMET"

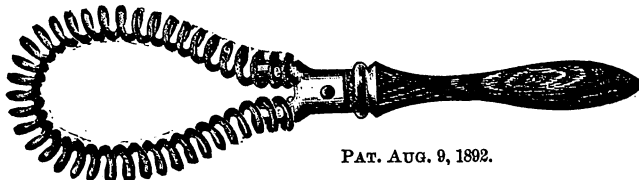
**Horse
Clippers.**

At prices to suit
the times.



Simonds Mfg. Co. Simonds Saw Co.
FITCHBURG, MASS. CHICAGO, ILL. SAN FRANCISCO CAL. PORTLAND, ORE.

THE BOSS DUST BEATER.



PAT. AUG. 9, 1892.

NEAT, DURABLE, AND DOES THE BUSINESS.

For removing dust and filth from Clothing, Upholstered Furniture, Rugs and Carpets it is just the thing. Will raise the nap and so improve the appearance. Will not, like other Dust Beaters, leave marks, nor tear the fabric. The coil is of steel wire secured in a malleable iron socket and attached to an enameled wooden handle. Just what everybody wants.

Retail Price, 25 Cents. Sent by Mail, 35 Cents.

PEABODY & PARKS,
Manufacturers, TROY, N. Y.

"If you want a Saw it is best to get one with a name on it which has a reputation.

A man who has made a reputation for his goods knows its value as well as its cost and will maintain it."—HENRY DISSTON.

THE SAWS THAT LEAD THEM ALL

DISSTON & SONS' PATENT D-8 HAND SAW.

"THE
SAW;"

HOW
TO

CHOOSE

IT,

AND

HOW

TO

KEEP

IN

ORDER,

Sent

Free

on

Receipt

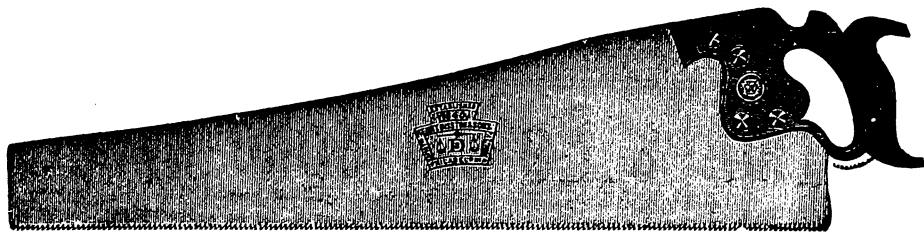
of

Name

and

Post Office

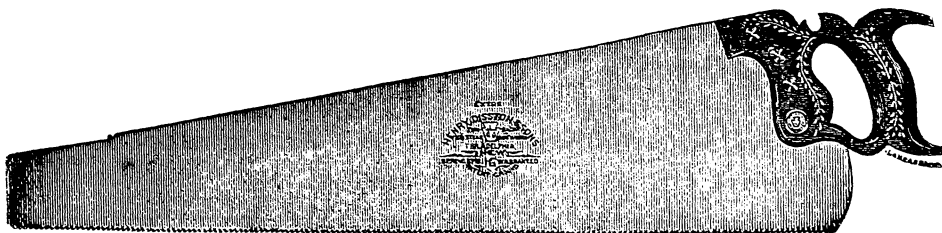
Address.



This Saw combines all the valuable improvements in Hand Saws that have been made by us of late. The first and most important is the hollow or skew back, the success of which can best be attested by the number sold. The peculiar shape of the butt or heel, coupled with the new method of fastening to the handle, give a full stroke of the blade without fear of catching or hooking in the work; and as the handle is put further on the blade you have a full stop on the proper point and a greater command over your Saw, by reason of being two inches nearer the point, which must give more power.

The Saw being let into the handle on a circle, has a perfect bearing, which, with the new screws, makes it stronger and almost impossible to work loose, and avoids the unsightly gap that is seen on the back of the old style handle. All the above features are patented.

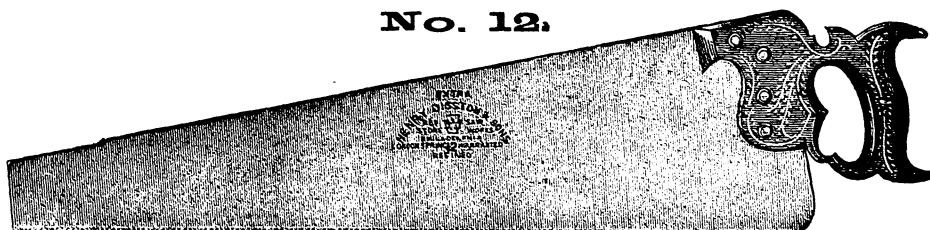
Our New No. 16 Premium Saw.



AN EXTRA FINE SAW IN EVERY RESPECT.

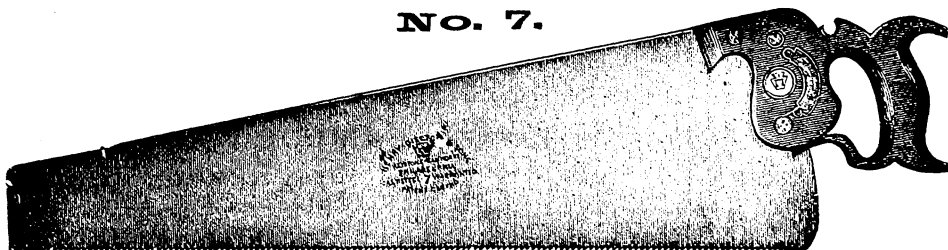
Having the Latest Close up Handle, Spring Steel Blade, Extra Thin Back, Finely Grained, with an Apple Handle and Four Brass Centennial Screws.

No. 12.



DISSTON & SONS' Extra Refined London Spring Steel, Selected and highly Polished Blade, Handle Carved and Polished, 4 Improved Brass Screws, the finest Hand Saw manufactured.

No. 7.



DISSTON & SONS' Cast-Steel, Warranted, Beech Handle, Polished Edge, 4 Improved Screws, Grained Blade.

"POCKET

EDITION

OF

THE

SAWYER "

and

"LUMBER-

MAN'S

HAND

BOOK,"

Sent

Free

on

Receipt

of

Name

and

Post Office

Address

ASK YOUR DEALER TO ORDER THEM FOR YOU.

HENRY DISSTON & SONS

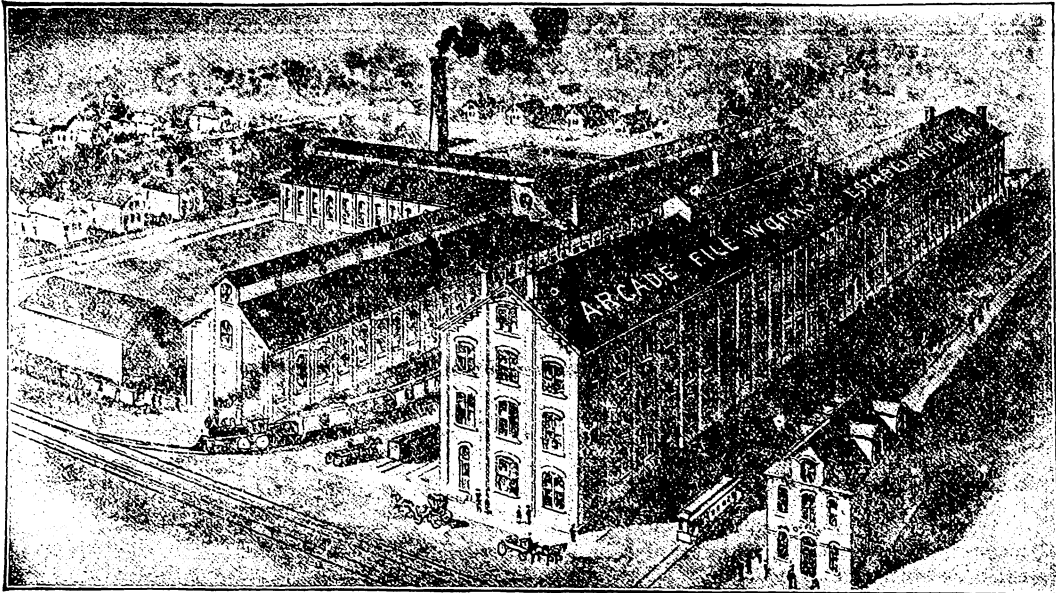
(INCORPORATED),

Keystone Saw, Tool, Steel and File Works, Philadelphia, Pa.

ARCADE FILE WORKS.

ESTABLISHED 1842.

Eastern Office and Warehouse,
83 READE STREET, NEW YORK CITY.



Western Office and Warehouse,
23 LAKE STREET, - CHICAGO, ILL.

Works: ANDERSON, IND.

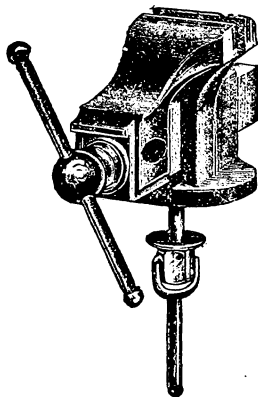
THE FILES

THAT LEAD

THEM ALL.

THE BEST EQUIPPED FILE WORKS IN THE WORLD.

The fact that we alone use the improved File Machinery recently invented by Alfred Weed, and the even heat of natural gas, enables us to produce a file that will cut faster and wear longer than any on the market




HOLLANDS' OFFSET JAW VISE.

Specially adapted for drill press work where chucks can not be used and equally good for special or regular bench work.

Hollands Mfg. Co.
ERIE, PA.,
Manufacturers all styles VISES.


Philadelphia, 1876.



McCaffrey File Co.,


FIFTH and BERKS STS.,


PHILADELPHIA, PA.



Manufacture and keep in stock a full line of **FILES** and **RASPS** only, for which we claim special advantages over the ordinary goods, and ask domestic and foreign buyers to allow us to compete for their trade.

Superiority acknowledged wherever used, sold or exhibited.





BUY BRADLEY BRACKETS!!!

Your Customers will like them. They are made of steel and are not brittle. They are light, strong and artistic. They can be put up with nail and hammer. Write for prices.

ATLAS MFG. CO.,
New Haven, - - Conn


IT PAYS. Nothing about a Hard ware Store looks as well as clean shelves and the goods neatly boxed with a fresh sample on the front. Customers are attracted by such a display of care, and notice and buy things that would ordinarily go without notice. The Boxes are inexpensive save the goods, make a big show for a small investment and help the salesmen. Send to **JESSE JONES & CO., 615 and 617 Commerce St., Phila., Pa.,** for Catalogue of prices, styles and references.

BEST

CRUCIBLE STEEL.

STRONGEST TOOTH.

"TROJAN" HORSE RASPS.



BANKER & WHITE,
(Troy File Works.)

LOWEST IN PRICE.

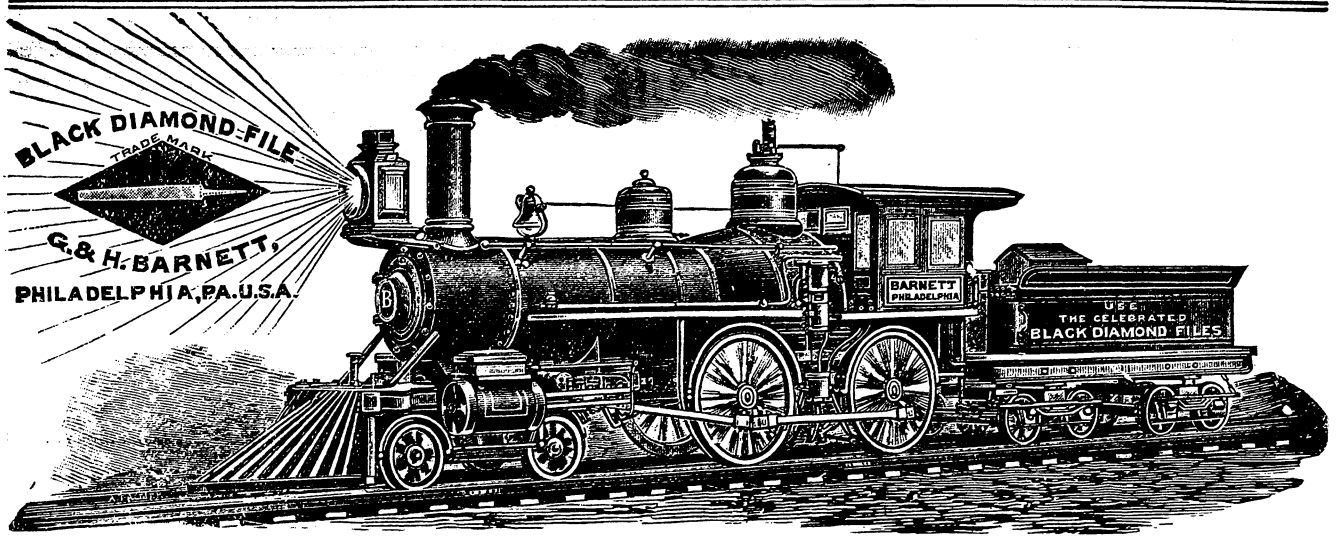
LET US QUOTE.

The Taintor Positive Saw Set.

Mechanics are now inquiring for this tool, and Hardware Dealers should have them in stock, or at least have a sample.

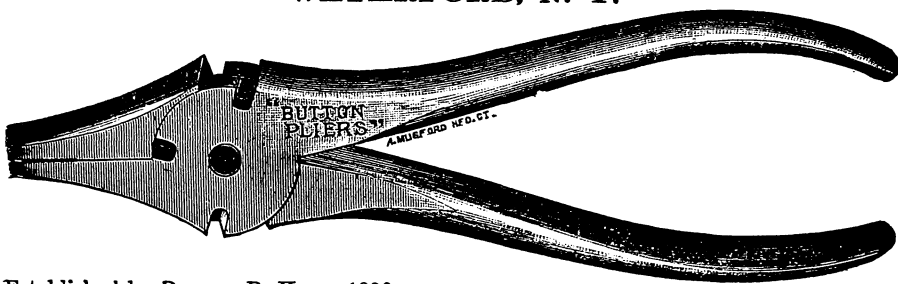
For Prices and Discounts, address

WIEBUSCH & HILGER, LTD., SOLE AGENTS,
84 and 86 Chambers Street, NEW YORK.



J. M. KING & CO.,
WATERFORD, N. Y.

Manufacturers of
BUTTON'S



**Pat. Wire Cutter
AND PLIER COMBINED.**

Specially Adapted for Use on Wire Fence.

Also Manufacturers of BLACKSMITHS' and
MACHINISTS' STOCKS and DIES, PLUG and
TAPER TAPS, HAND, NUT and SCREW
TAPS, PIPE TAPS and REAMERS.

Price-List on Application.

Established by DANIEL B. KING, 1829.

GARY'S METAL STRAP,

PATENTED IN ALL COUNTRIES.

A SUBSTITUTE FOR

STRAP IRON AND WOOD STRAPS,

— FOR —

**Binding Packing
Cases, Crates, etc.**

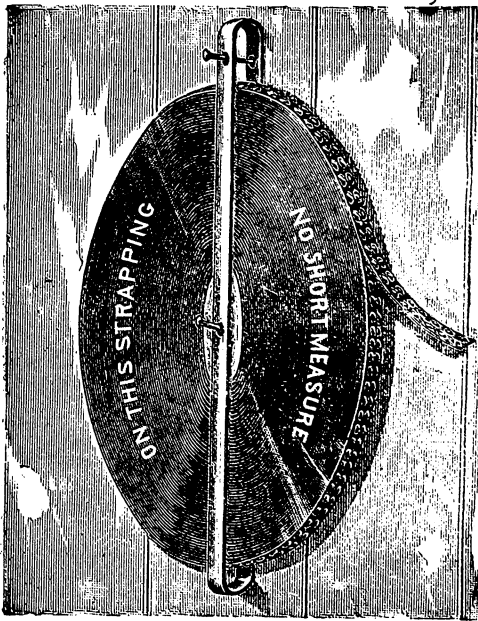
Put up in Coils of 300 Feet in
Length and Packed in Cases
Containing 20 Reels Each.

Made in different widths of a Soft
Steel through which nails can be
readily driven without the necessity
of first punching holes for same.

SAVES TIME AND WASTE.

GARY MANUFACTURING CO.,

5 to 9 Elm Street, NEW YORK.



SHOWING REEL HUNG UP READY FOR USE.

THE MALIN & CO.

34 and 36 Long St., Cleveland, Ohio

Manufacturers and Dealers in Steel, Copper and Brass
Wire of all kinds.

Patent Spooled Wire

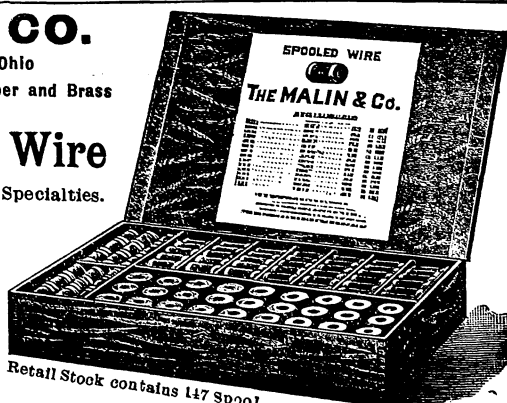
For Retail Hardware Trade and Wire Specialties.

Dealers who handle it do away with the
Broken Bundle Business and sell small quan-
tities by the spool only. It is a convenience
for both dealer and consumer. It is Shellac
Coated and Cannot Rust: is wound like spool
cotton on 1 oz., ¼ lb., ½ lb., 1 lb. and 5 lb.
Spools.

Special Wires Spooled for manufacturing
purposes. Send for illustrated Catalogue
and prices. Sold by all Hardware Dealers.

BOSTON OFFICE,

JOHN WALES & CO., No. 5 Winthrop Sq



NICHOLSON FILE CO.
 PROVIDENCE, R. I.
 THE LARGEST AND MOST COM-
 PLETE FILE WORKS IN
 THE WORLD.
 3000
 VARIETIES FILES
 (X.F.) AND INCREMENT CUT FILES

TRADE MARK



John Wilson's Butchers' Knives and Steels, Skinning, Sticking, Farriers' & Shoe Knives,

Have established and maintained their reputation, for superiority,
against all Competitors, from

THE YEAR SEVENTEEN HUNDRED & FIFTY,
and are still in increasing demand. As in the past, it is the unalterable
DETERMINATION OF THE HOUSE TO SEND OUT NOTHING BUT WHAT IS OF THE HIGHEST POSSIBLE QUALITY.

WORKS: SYCAMORE STREET, SHEFFIELD, ENGLAND.

SOLE AGENTS FOR THE UNITED STATES, AND THE CANADAS.

Messrs. Hermann Boker & Co., 101 and 103 Duane St., New York.



JOSEPH RODGERS & SONS, Limited.

—MANUFACTURERS OF—

Pocket and Table Cutlery, Scissors, Razors, Erasers, &c., &c.

These goods have fully maintained their reputation as the best cutlery in the world for over

ONE HUNDRED AND FIFTY YEARS.

Any Infringements of our Name and Corporate Mark will be promptly prosecuted.

Sole Agents for the United States,

ALFRED FIELD & CO., 93 Chambers and 75 Reade Street, New York.

Established 1836.

ALFRED FIELD & CO.,

93 Chambers and 75 Reade Streets,

NEW YORK.

IMPORTERS OF

HARDWARE, CUTLERY, GUNS, ANVILS,
CHAINS, FILES.

SOLE AGENTS FOR

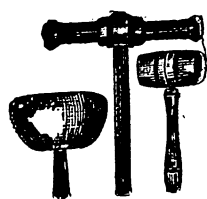
Joseph Rodgers & Sons, Best Cutlery in the world; W. K. & C. Peace, unrivaled Grass Hooks, Straw Knives and Scythes; Joseph Elliot & Sons, Celebrated Razors; Peugeot Frères, "French Toilet" and other Clippers; L. Hugoniot Tissot, Fine Steel Plyers, &c.; Eley Bros., Caps, Wads, Cartridge Cases, &c.; Webster & Horsfall, Steel Wire of every description.

Send for Rodgers' New Illustrated Catalogue

MANUFACTURERS of Ship Carpenters', Tinnners', Coopers' and Butchers' Tools. Our specialties are Meat Cutting Machine Knives, Planing Mill Knives, Leather Splitting and Paper Cutting Machine Knives, Butchers' Cleavers, Bark Spuds, &c., &c. We solicit a share of your valued orders.

BUFFALO EDGE TOOL WORKS,

RIDGWAY, PA.

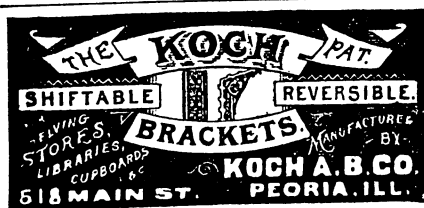


N. Y. Mallet and Handle Works.

MANUFACTURERS OF
MALLETS.

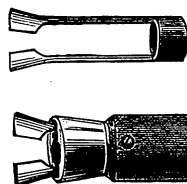
Also Cotton and Bale Hooks.

Patented Feb. 13, 1877, a new combination of Hooks.
456 E. HOUSTON ST.,
New York City.



NEW M. & P. RATCHET

BRACE.



POINTS:

Fewest parts of any.
No pins to cut.
The finest finish.
Oil tempered Jaws.
Will hold twist drills.
Double the strength.
Strain equalized.
Steel clad head.
Steel and babbitt bearings.

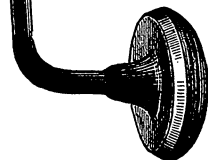
A BEAUTY.

MASON & PARKER,
Winchendon, - Mass.

Five Sizes.

6 to 14 in.

Sweep.



Underhill, Clinch & Co.,

94 Chambers St., New York.

American Screw Co.'s Screws, Bolts, Rivets, &c.

Oliver Ames & Sons' Shovels.

Germantown Tool Works' Hammers and Hatchets.

Richardson Bros.' Saws.

Branford Lock Works' Locks, &c.

(Yale & Towne Mfg. Co., Lessee.)

GENERAL HARDWARE.



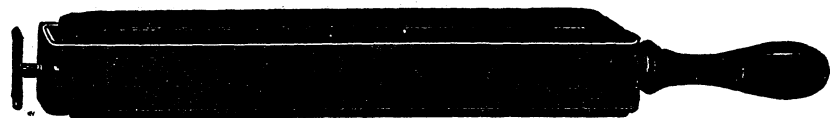
THE TRADE acknowledges our make of **BUTCHERS' STEELS**
THE BEST IN THE WORLD.

FOR CATALOGUES AND PRICE-LISTS ADDRESS

C. & A. HOFFMAN, Manufacturers, FRANKFORD, PHILA., PA.

J. R. TORREY & CO., Worcester, Mass.

New York Office: 74 Reade Street.



No. 8 X.

The **TORREY RAZOR STROPS** are known the world over as the standard for excellence in setting a fine edge. We manufacture and carry in stock more than 150 styles.

—Send for Illustrated Catalogue.—

"Stamped with the BUCK'S HEAD."

BUCK BROTHERS EXTRA.**BUCK BROTHERS,**

MILLBURY, MASS.

The Most Complete Assortment in the U. S. of

Shank, Socket Firmer and Socket Framing Chisels.

PLANE IRONS.

TRADE MARK

Buyers are cautioned against any parties who claim a recent connection (or any connection for over 20 years) with Buck Bros., or who represent goods as our make not stamped with the **BUCK'S HEAD** or **BUCK BROS.** in full.

Established 1825.

Incorporated 1892.

R. HEINISCH'S SONS CO.,

NEWARK, N. J., U. S. A.

New York office, No. 90 Chambers St.

Tailors' Shears, Trimmers, Scissors, Tinnerns' Snips, etc.

CATALOGUES AND PRICES ON APPLICATION.

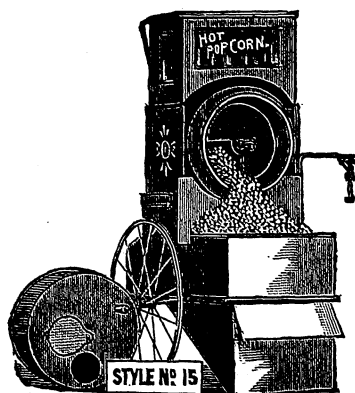
WE HAVE NO CONTRACT WITH MESSRS. HERMANN BOKER & CO. AS AGENTS FOR THE SALE OF OUR GOODS.

HIGHEST AWARD PARIS EXPOSITION, 1889.

ESTABLISHED 1837.
INCORPORATED 1892.

THE L. & I. J. WHITE CO.
BUFFALO, N. Y.

MANUFACTURERS OF EDGE TOOLS.
Coopers', Carpenters' and Ship Tools, Plane Irons, Cleavers, &c. Full Line Chisels.



OLSEN'S AUTOMATIC
King of Corn Poppers, Peanut
and Coffee Roasters.

The greatest wheel of fortune out, for any person 12 years and upward; \$1.00 to \$50.00 profit per day; 1500 now in use.

Guaranteed to have no equal. Agents wanted.

Write for illustrated catalogue and prices on Pop Corn, Shelled or on Cob, Balls, Bricks and other supplies.

A. B. OLSEN, Sole Mfr.,
218-220 E. Mo. Ave., Kansas City, Mo.

Cast Shears.

ACME SHEAR CO.,

BRIDGEPORT, - CONN.

MARTEN DOSCHER,**Commission Hardware,**

88 Chambers St., New York.

Agent—G. W. Bradley's Edge Tools, Axes, Coopers' Tools, Cleavers, Bush Hooks, Draw Knives, Ship-Carpenters' Tools, &c. Also a full stock of Planes, Brooks' Bright Wire Goods, Washita Stone, and Taunton Tack Co.'s Rivets, &c.

ALASKA.

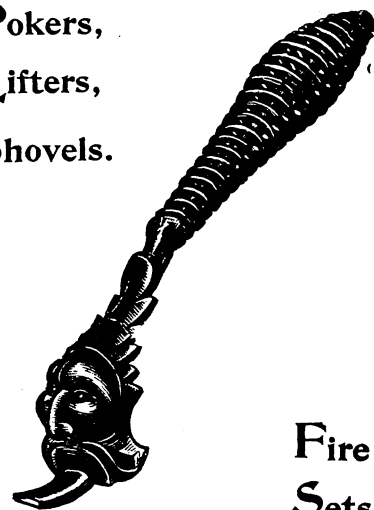
ALWAYS COLD.

Stove Trimmings.

Pokers,

Lifters,

Shovels.



Fire Sets.

For Sale by All

First-class Jobbers in Hardware.

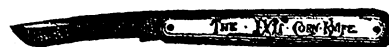
Made under Gaitly Patents and only by

Troy Nickel Works,

TROY, N. Y.

FRANCIS FROST & CO., Toronto, Ont.
Canadian Sales Agents.

WHEN IN WANT OF
WOSTENHOLM'S

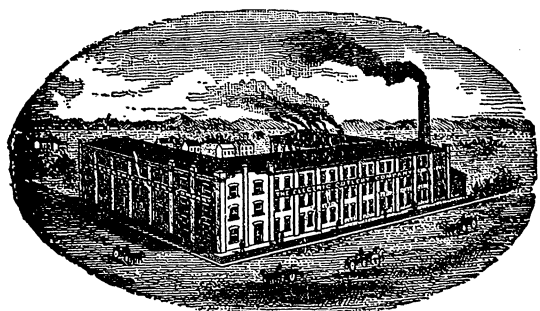
I★XL**Knives or Razors,**

SEND TO

FRED. B. GURNEY,

116 Chambers St., N. Y.

The Best Equipped Cutlery Works in the World.



FACTORY: FOURTH & DICKERSON STS. NEWARK, N. J.

THE ELECTRIC CUTLERY CO.,

113 Chambers St., N. Y., and Newark, N. J.

Manufacturers of Razors, Knives
Razor Strops, Scissors and Shears

(SEND FOR CATALOGUES.)

NORTHAMPTON CUTLERY CO.,

NORTHAMPTON, MASS., and 122 CHAMBERS ST., NEW YORK.

WE CALL ESPECIAL ATTENTION TO OUR COMPLETE LINE OF FINE GOODS IN RUBBER,
CELLULOID, BONE, IVORY, &c.

— OUR CLAIMS ARE: —

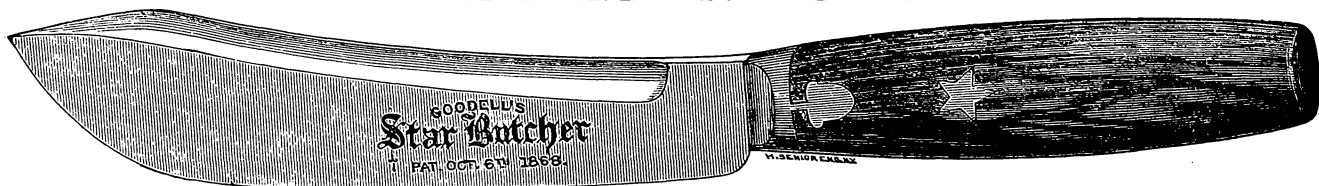
EXTRA QUALITY OF STEEL IN BLADES.

SUPERIORITY IN GRINDING AND FINISH.

STRENGTH AND DURABILITY

Made in Plain Steel or Heavily Plated Blades, Hand Burnished.

THERE IS NOTHING NEW
TO SAY ABOUT THIS KNIFE EXCEPT
IT IS GROUND SHARP.



WE DON'T KNOW HOW TO IMPROVE IT.

Blade is made of steel especially prepared for the purpose, and it is made just right; finish excellent; shape unsurpassed; the handle just fits the hand.

GENERAL APPEARANCE IRREPROACHABLE.

Made in sizes from 5 inch to 8 inch; a strictly first-class butcher knife at a moderate price.

WE HAVE OTHER BUTCHER KNIVES,

4½ to 14 inch blade, that will cut as well, for less money. Also Table Knives and Forks, Carvers, Butcher Steels, Bread Knives, Cheese Knives, Butter Spades, Apple, Kitchen, Putty, Cigar, Shoe Knives, &c., &c., in great variety. We aim to make the best and sell at reasonable prices.

GOODELL COMPANY, ANTRIM, N. H.

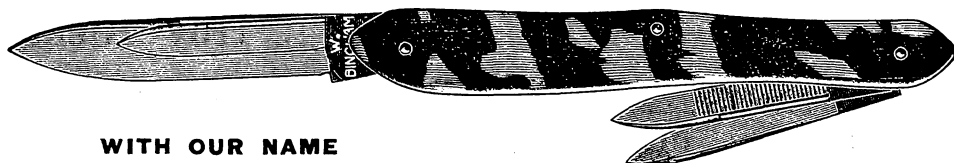
AGENTS:

THE ALFORD & BERKELE CO., 77 Chambers St., N. Y. City.

HENRY KEIDEL & CO., Baltimore, Md.

A

Knife,
Razor,
Scissor,
Shear,



WITH OUR NAME

IS THE BEST
THE W. BINGHAM CO., Cleveland, O.

That money
and 50 years
experience can
buy.

Drills for Wood
& Metal, Counter-
sinks, Screw
Drivers, Chucks,
&c., for sale by
the trade.

Syracuse Twist Drill Company,

SYRACUSE, N. Y.



Every tool fully
Guaranteed.
Beware of im-
itations.



Size 14 $\frac{1}{4}$ in. long by 1 $\frac{1}{2}$ in. wide.

Indispensable to good housekeeping.—Emma P. Ewing.

DID YOU EVER hear of THOSE WONDERFUL CHRISTY KNIVES?

Ever experience the delight of being able to cut Bread just out of the oven as easily as that which is two or three days old? Ever see Cake sliced like cheese, icing and all, without a crumb being wasted? Ever own a Carver that never got dull, and that made CARVING A LUXURY? or a Parer that it was simply a delight to use? In other words, did you ever see a set of CHRISTY KNIVES?

Ask your wholesale dealer for prices on Christy Knives.

There are imitations and counterfeits with cast iron handles—cheap but not good.

You will find it profitable to be posted on Christy Knives.

The Christy Knife Co.,
FREMONT, OHIO.

NICHOLS BROTHERS, Greenfield, Mass., U. S. A.

BUTCHER KNIVES, CLEAVERS, STEELS, ETC.

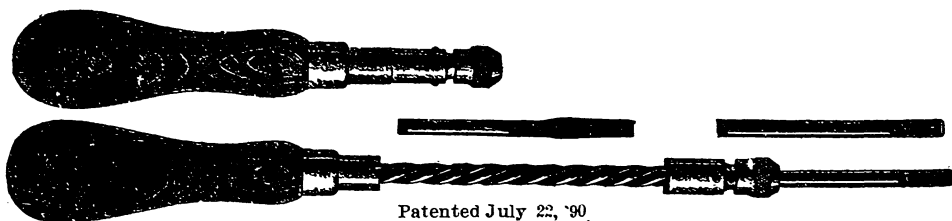
TRADE DISCOUNTS AND CATALOGUE ON APPLICATION.



NOW IS THE TIME to replenish your stock of GOODELL'S AUTOMATIC SCREW DRIVERS.

Watch this space next month.

An Automatic,
Ratchet
and Plain
Screw Driver
all in one.



The
acknowledged
STANDARD.

Patented July 22, '90.

All live jobbers carry them. Accept no substitute. Cheap tools are dear at any price. All our goods are made to work well, last long, and reflect credit upon the dealer who sells them and honor upon the whole Hardware fraternity. We have several new specialties shown in our new catalogue. Do you want a copy?

H. H. MAYHEW CO., - - - **Shelburne Falls, Mass., U. S. A.**
Manufacturers of Fine Mechanics' Tools.

SNELL MANUFACTURING CO., 72 Reade St., New York,

MANUFACTURERS OF

Ship Augers, Auger Bits, Boring Machines and Boring Implements.

ESTABLISHED 1790.

FIRST PREMIUM AWARDS: Mass., 1841, 1848, 1850; International Ex., Paris, 1878; Centennial Ex., Phila., 1876



Manufacturers of Car Bits, Jennings' Pattern Auger Bits, Boring Machine Augers, Carpenters' Augers, Mill Augers, Rafting Augers, Gimlets and Gimlet Bits, and Screw-driver Bits.

All Kinds of Machine Bits Made to Order.

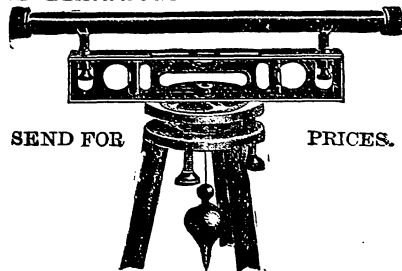
All Goods made of the Best Quality of Cast Steel and Warranted. First Premium Medals taken for Superior Quality and Excellence of Finish.

Factory, - - - **Fiskdale, Mass.**

THE CLARK MFG. CO.,

Blind Hinges, Gate Hinges, Door Butts,
And other HARDWARE SPECIALTIES
BUFFALO, N. Y.

LEVELING & SQUARING INSTRUMENT



SEND FOR

PRICES.

C. F. RICHARDSON & SON,
ATHOL, MASS.

Manufacturers of Iron Levels and Carpenters,
and Architects' Transits.

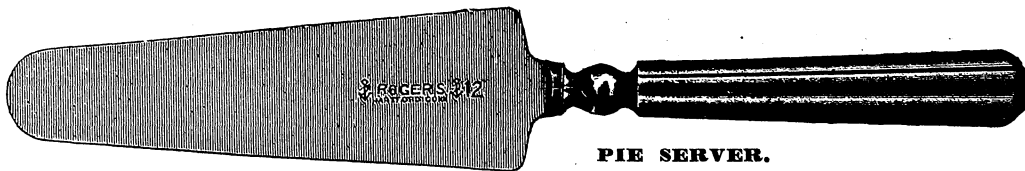
Spon's Tables and Memoranda for Engineers.
11th edition (vest-pocket edition). 140 pages, flexible leather.....\$0.40
For Sale by David Williams, 96-102 Reade St., N. Y.

—NONE BETTER—

THAN THE



SILVER PLATED WARE.



PIE SERVER.

MANUFACTURED BY

THE W. M. ROGERS MFG. CO.,

Office and Factory, HARTFORD, CONN. P. O. Drawer 30.

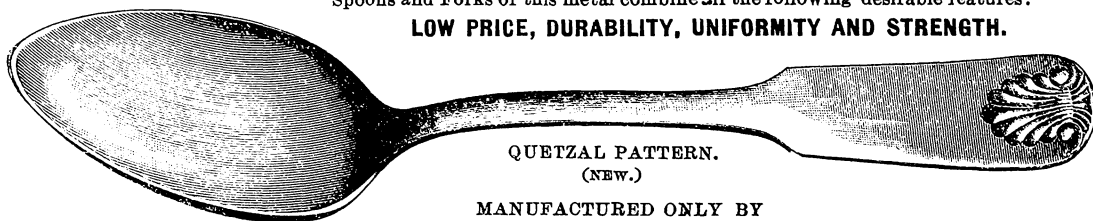
NEW CATALOGUE FOR THE ASKING.

AZTEC COIN METAL

MADE INTO SPOONS AND FORKS.

Spoons and Forks of this metal combine all the following desirable features:

LOW PRICE, DURABILITY, UNIFORMITY AND STRENGTH.

QUETZAL PATTERN.
(NEW.)

MANUFACTURED ONLY BY

THE HOLMES & EDWARDS SILVER CO.,

Bridgeport, Conn.



The Bridgeport Chain Co.'s Triumph
Chain, made into Halters
Traces, Cow Ties, Tie-

outs, Kennel Chains, &c.; also cut to lengths for manufacturers' use.

The cut represents the exact size of 6/O.

Thirteen Sizes made, 6/O being the Largest.

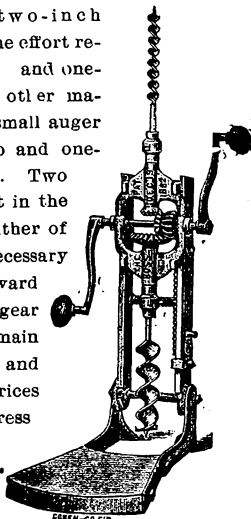
FACTORY AT
BRIDGEPORT, CONN.

The Boss 2-speed Boring Machine.

Will operate a two-inch auger with the same effort required in using and one-half inch in any other machine, and for the small auger have a speed two and one-half times faster. Two augers may be kept in the machine, to use either of which it is only necessary to point it downward by first taking the gear frame out of main frame, inverting and replacing it. For prices and discounts address

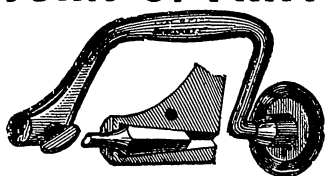
Buckeye Mfg. Co.

Union City, Ind



JOHN S. FRAY & CO.,

BRIDGEPORT, CONN., U. S. A.



Spofford Bit Brace.

The Spofford Bit Brace is made under Letters Patent of the U. S. A., granted to N. Spofford, March 23 1880 assigned to John S. Fray & Co.

All Iron, Five Sizes.

Cocobolo Head and Handle, Nickel Plated.

No. 7.....7 inch sweep.

No. 8.....8 "

No. 10.....10 "

No. 12.....12 "

No. 14.....14 "

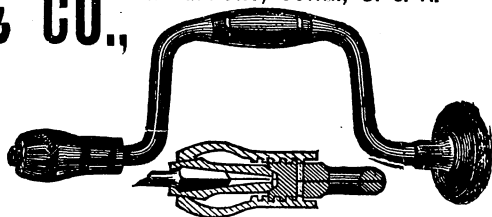
No. 107.....7 inch sweep.

No. 108.....8 "

No. 110.....10 "

No. 112.....12 "

No. 114.....14 "



Spofford Sleeve Brace.

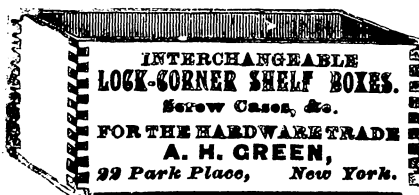
Sleeve Brace, Nickel Plated.

No. 70.....7 inch sweep.

No. 80.....8 "

No. 100.....10 "

No. 120.....12 "



HIGH GRADE AXES AND TOOLS.

DOUBLE BIT AXES, CARPENTERS' ADZES,
SINGLE BIT AXES, MINING PICKS,
BROAD-AXES, MACHINE KNIVES,
HAND-AXES, BARK SPUDS.

We make all patterns and styles of Axes, including PEELING AXES, RAFTING AXES, BOYS' AXES, Etc., Etc. Our "BLACK EAGLE" AXE is made by a Chemical Process, known only to us, and never fails in frozen or knotty timber.

STANDARD AXE & TOOL WORKS,
RIDGWAY, PA., U. S. A.

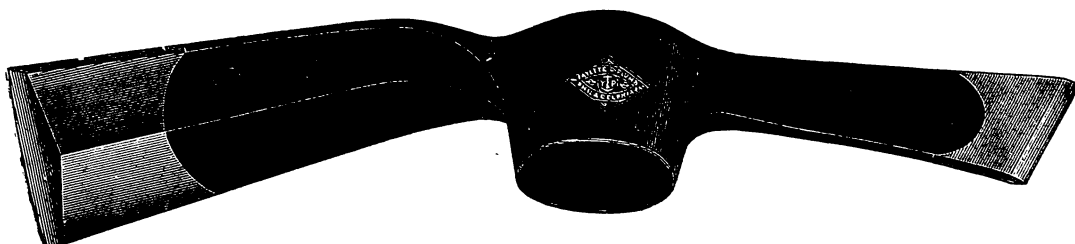
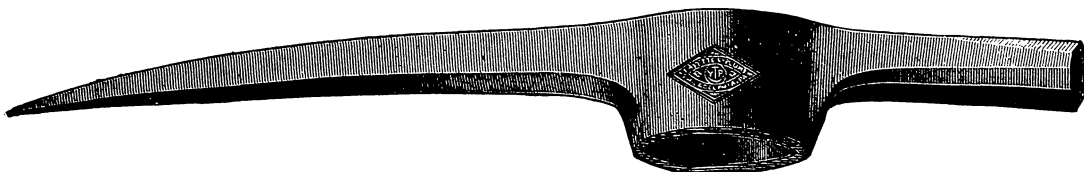
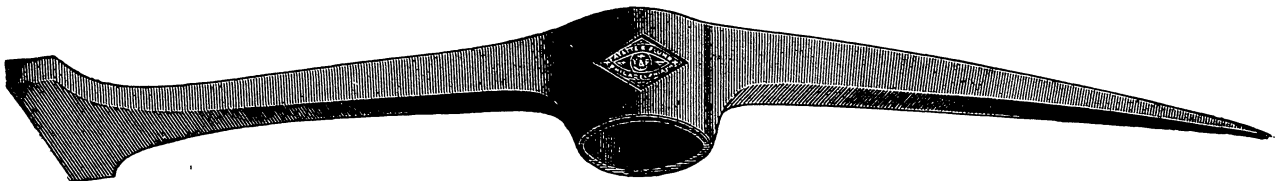
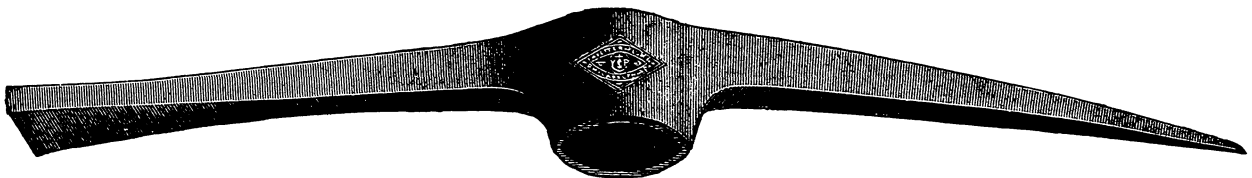
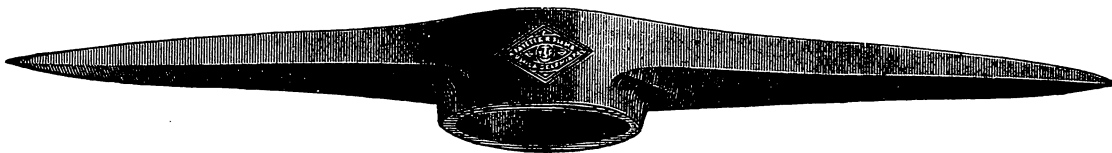
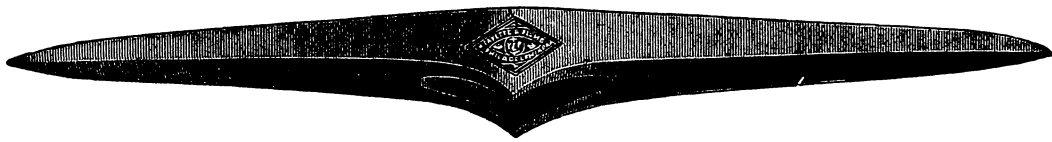
Fayette R. Plumb,

MANUFACTURER OF

Edge Tools, Hammers and Sledges,

Railroad, Miners' and Blacksmiths' Tools.

PICKS, MATTOCKS and CRUB HOES.



PHILADELPHIA, PA., U. S. A

THE AMERICAN AXE AND TOOL CO.,

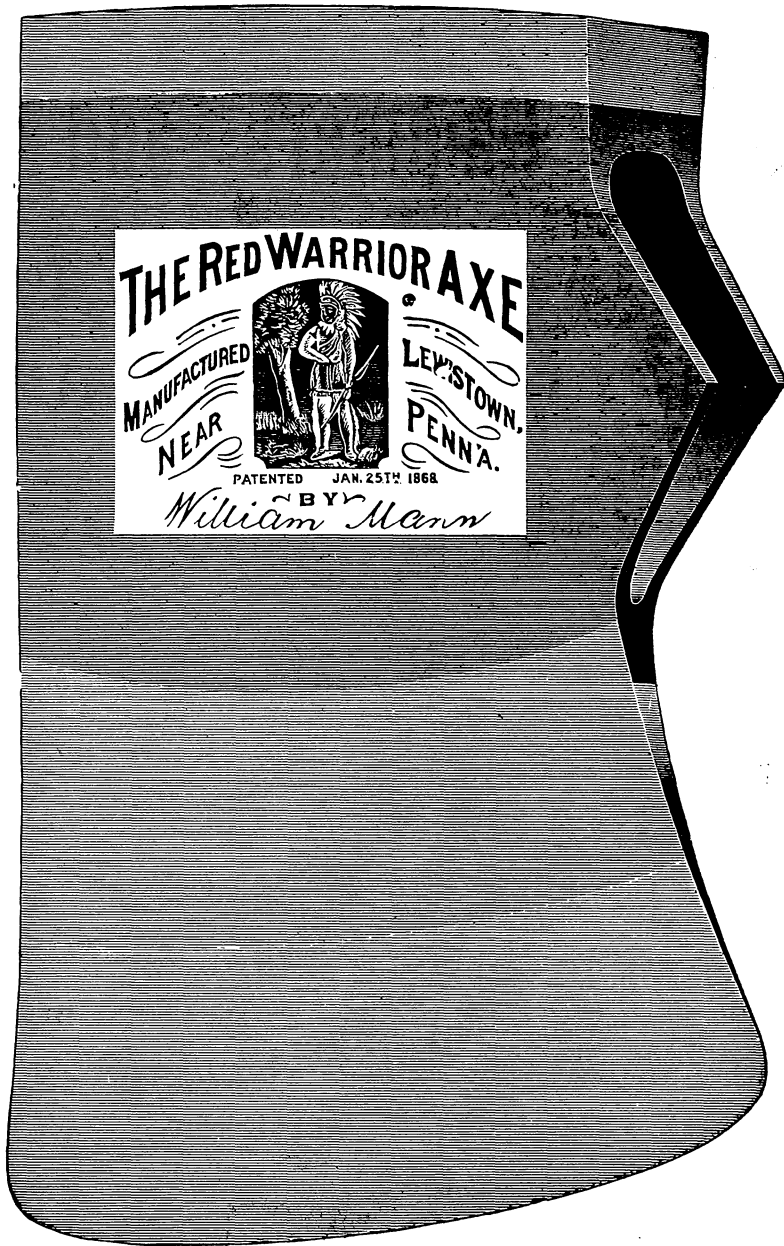
STEWART BUILDING, Rooms 63 to 67,
280 Broadway, - - - **NEW YORK.**

Manufacturers of

BLOOD, HUNT, LIPPINCOTT, RED WARRIOR, MANN, HURD, PEERLESS, JAMESTOWN,
ROMER, FRANCIS, SHARPS, UNDERHILL, STEWART,

Brands of

AXES, HATCHETS, BROAD AXES and ADZES, also "Blood's" Champion and
"Hubbard's" Diamond Blade SCYTHES.

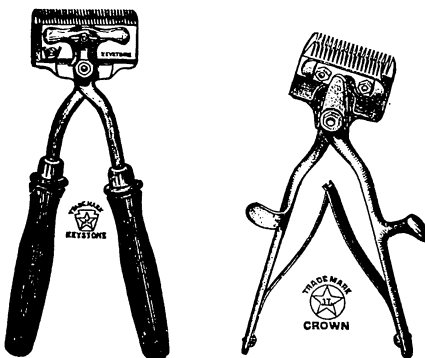


Grass Hooks, Corn Knives, Bush Hooks, Planters' Eye Hoes, Ice Axes, Ice Hatchets and Firemen's Axes, Wood Chisels, Picks, Mattocks, Brick Hammers, Box Openers, Ice Chisels, Butchers' Handled Axes, Meat Hatchets.

ALWAYS IN STOCK: Best Leading Brands of Axes and Edge Tools. Cheap Handled Axes. Medium Grade Axes. Boys' and Hunters' Axes. **Job Lots of Axes, all Grades and Patterns.**

ADDRESS ALL CORRESPONDENCE TO NEW YORK OFFICE.

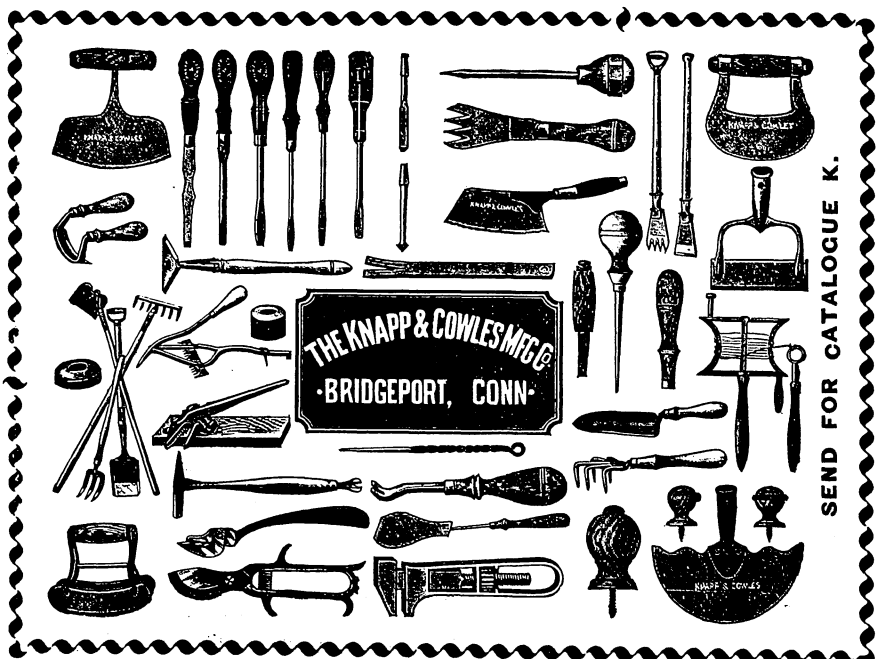
IF YOU ARE INTERESTED IN
CLIPPERS



For HORSEMEN OR BARBERS
Send Postal Card for our new Illustrated Catalogue.

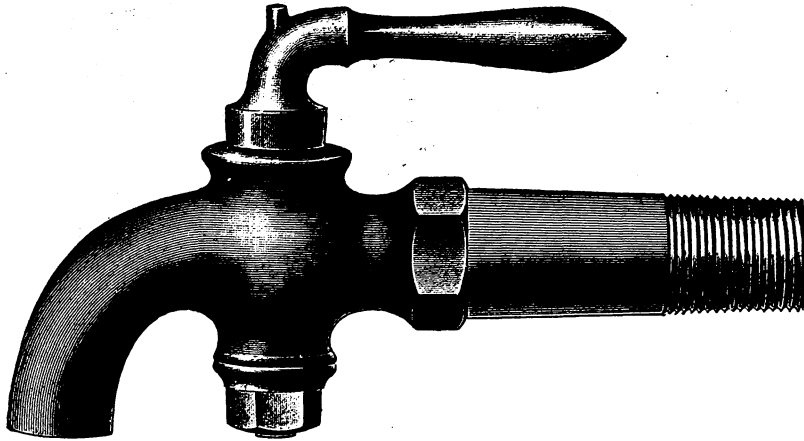
JESSE LEE & SON,
37 SO. FOURTH ST., PHILADELPHIA.

Iron and Steel. The Journal of the Iron and Steel Institute. No. 2, 1892. 584 pages, with 27 plates. \$8.00
For Sale by DAVID WIL LIAMS, 96-102 Reade St., N. Y.



SEND FOR CATALOGUE K.

Standard Petroleum Oil Faucets.



These Faucets are made from the best Refined Iron, with Solid Brass Key, and are fully warranted. The bearing is longer than in the ordinary faucet, making them less liable to break. Made in following sizes.

	$\frac{3}{8}$ in.	$\frac{1}{2}$ in.	$\frac{5}{8}$ in.	$\frac{3}{4}$ in.	1 in.
SCREW SHANK,	No. 13	No. 14	No. 5	No. 6	No. 7
TINNED "	No. 013	No. 014	No. 05	No. 06	No. 07
LIST,	\$6.75	\$8.25	\$9.00	\$10.50	\$12.00 per Dozen.

Write to us for Discounts, we can interest you.

JOHN H. GRAHAM & CO., SOLE AGENTS,

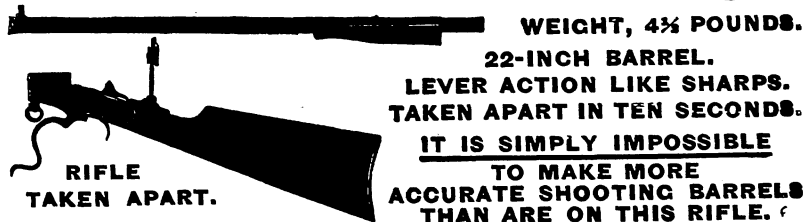
113 CHAMBERS ST., NEW YORK.

P. O. BOX 1042.

A Triumph in Small Bore Rifles. STEVENS' "FAVORITE" RIFLE.



Made for the 22 or 25 Rim Fire Cartridge.



- No. 17. Plain Open Sights.....\$12.50
 No. 18. Vernier, Open Back, and Beach Front Sights..... 17.00
 No. 19. Lyman Peep, Open Back, and Lyman Front Sights, 17.00

A 60 Page Catalog showing our full line of Fire Arms with **TRADE PRICE LIST** sent with pleasure to all dealers.

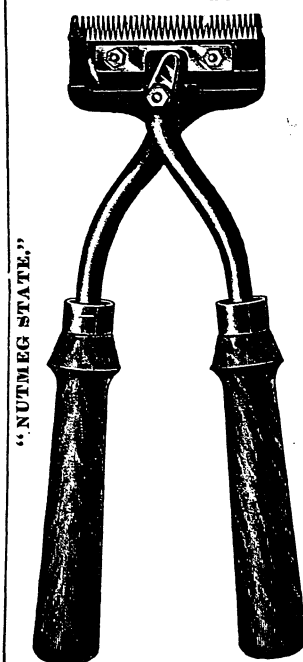
J. Stevens Arms & Tool Co.,

P. O. Box 5729.

Chicopee Falls, Mass. U. S. A.

Edward S. Hotchkiss,

MANUFACTURER OF HARDWARE,
BRIDGEPORT, CONN.



SATISFACTORY PRICES. Standard goods. Don't fail to write when in want of Horse and Barber's Clippers, No. 20 Steel Rat Killers, Curry Combs, Metal and Wood Choker Mouse Traps, Lemon Squeezers, Baxter Pattern Wrenches, &c., &c.

AMERICAN TOOL COMPANY,

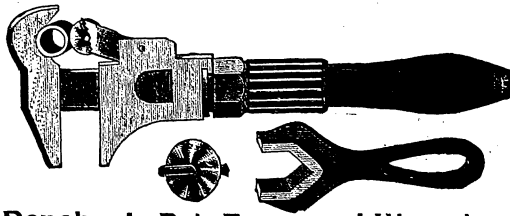
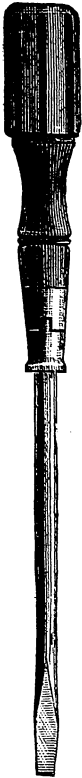
NEW YORK,
MANUFACTURERS OF

TOOL CHESTS

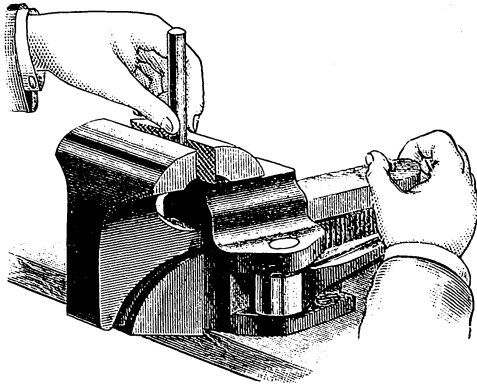
Of all sizes, complete with tools, for Hardware, Toy, Notion and Variety trades.
Factory and Salesroom,

200 West Houston Street, near Varick.
Also Machinists' Tool Chests, empty. Illustrated Catalogue and prices furnished on application.

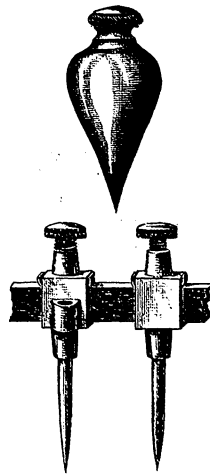
HIGH QUALITY TOOLS



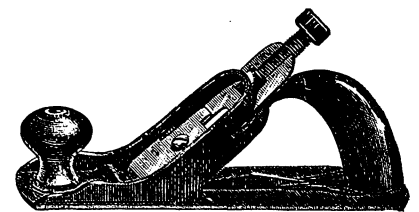
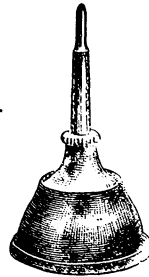
Donohue's Pat. Engineers' Wrenches,
Short or Long Sleeve Nuts, and
with Pipe Cutter.



Stephens' Patent Vises, Quick Adjust-
ing Cam and Toggle-Joint, Sta-
tionary or Swivel Base.



Chaplin's Patent Iron Planes,
Corrugated Bottoms,
Checked Rubber
Handles.



Challenge Iron Planes.
Simplicity of Construction.

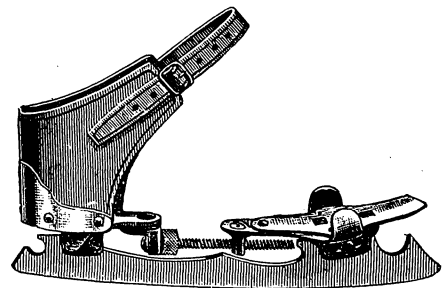
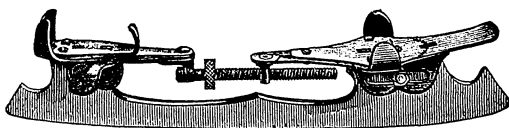
Boardman's Pat. Wrenches, Excelsior Expansion Bits, Whitney Drills, Baxter's Wrenches,
Wood's Pat. Plumb and Levels, Devoe's Square Attachments, Gem Wrenches,
Malleable Oilers and Lamps, Pencil Attachments.

TOWER & LYON, Manufacturers, - - 95 Chambers St., New York.

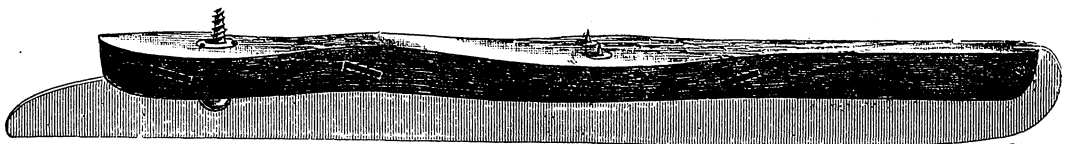
ICE SKATES

—MANUFACTURED BY—

THE UNION HARDWARE CO.,
Torrington, Conn.



DONOGHUE RACING SKATE.



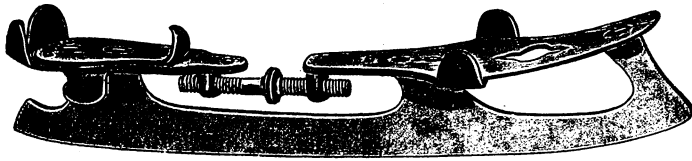
SUPERIOR QUALITY, STYLE AND FINISH.

—NEW YORK OFFICE:—

TOWER & LYON. - - - - 95 Chambers Street.

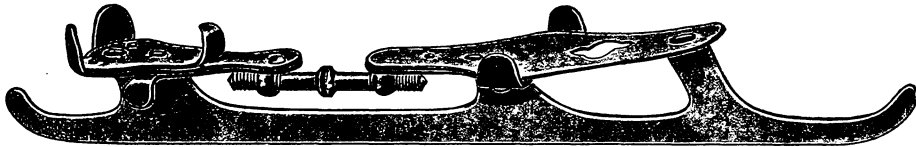
SICKELS, SWEET & LYON,

WHOLESALE HARDWARE,



Office, 35 Barclay Street,
Warehouse, 40 Park Place,

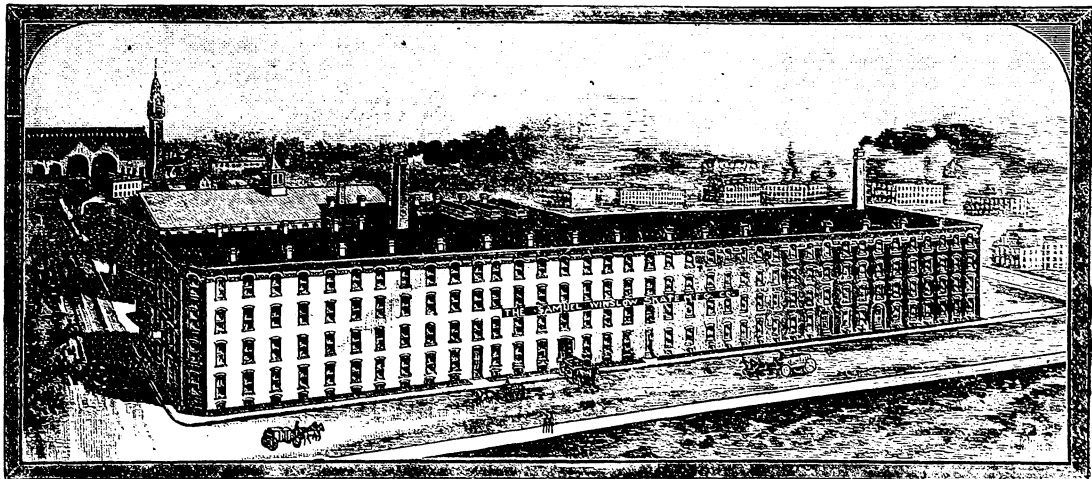
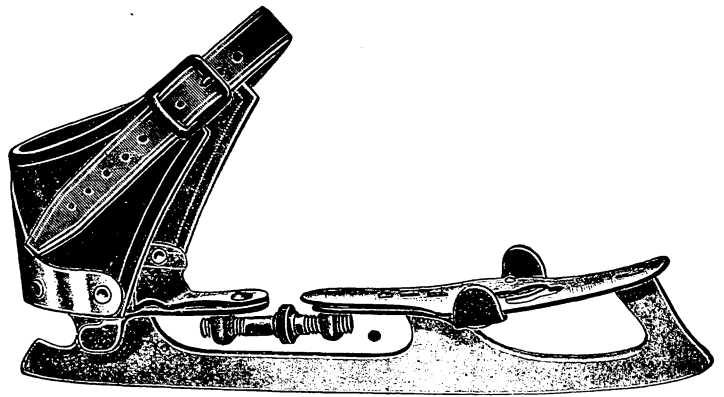
NEW YORK.



NEW YORK
SELLING AGENTS

FOR

Winslow's Skates.



DAME, STODDARD & KENDALL,

IMPORTERS AND WHOLESALERS,

374 Washington St., Boston, Mass.

Headquarters for Winslow Skates.

Obtain our Prices before Ordering Elsewhere.
1893-94 Catalogue Now Ready.



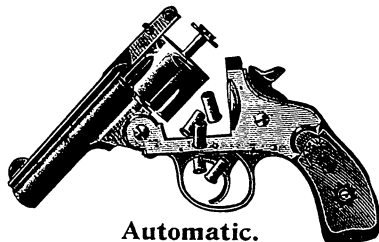
New Double Action.

Send for Illustrated
CATALOGUE free.

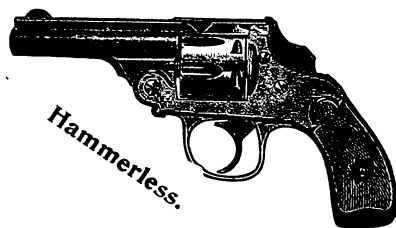
FOREHAND ARMS CO'S.

LINE OF QUICK SELLING

REVOLVERS.



Automatic.



Hammerless.

Forehand Arms Co.,

—ALSO—

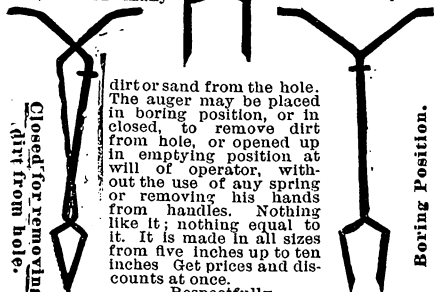
MANUFACTURERS OF A LARGE LINE OF GUNS
FOR THE HARDWARE TRADE,
WORCESTER, MASS.

THE IMPROVED "GEM" POST HOLE AUGER.

Opened for Emptying.

Is the most desirable
Auger ever offered
to the public.
The blades are at-
tached direct to the
steel handles. The
weight is reduced by
four pounds, yet is
stronger. Will work
in any kind of soil
that any other auger
will, and in many

places where other
augers will not
work. Sent on trial,
and if not satis-
factory it may be re-
turned at our ex-
pense. The shape of
the bits is such at
the point as to allow
the same to be closed
so close as to be able
to remove very fine



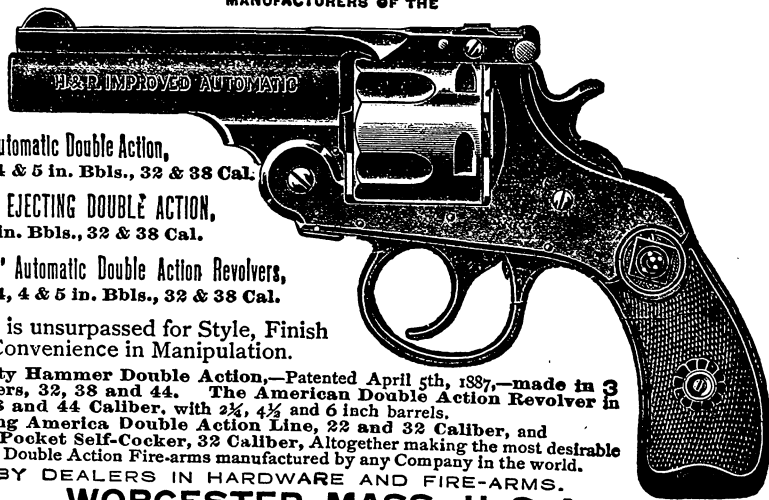
dirt or sand from the hole.
The auger may be placed
in boring position, or in
closed, to remove dirt
from hole, or opened up
in emptying position at
will of operator, with-
out the use of any spring
or removing his hands
from handles. Nothing
like it; nothing equal to
it. It is made in all sizes
from five inches up to ten
inches. Get prices and dis-
counts at once.

Respectfully,

BUCKEYE MFG. CO., Union City, Ind.

Harrington & Richardson Arms Company,

MANUFACTURERS OF THE



Improved Automatic Double Action,

3 1-4, 4 & 5 in. Bbls., 32 & 38 Cal.

IMPROVED EJECTING DOUBLE ACTION,

3 1-4 in. Bbls., 32 & 38 Cal.

"Premier" Automatic Double Action Revolvers,

3 1-4, 4 & 5 in. Bbls., 32 & 38 Cal.

This line is unsurpassed for Style, Finish
and Convenience in Manipulation.

The Safety Hammer Double Action.—Patented April 5th, 1887,—made in 3
Calibers, 32, 38 and 44. The American Double Action Revolver in
32, 38 and 44 Caliber, with 2½, 4½ and 6 inch barrels.
The Young America Double Action Line, 22 and 32 Caliber, and
The Vest Pocket Self-Cocker, 32 Caliber, Altogether making the most desirable
line of Double Action Fire-arms manufactured by any Company in the world.

SOLD BY DEALERS IN HARDWARE AND FIRE-ARMS.

WORCESTER, MASS., U. S. A.

Lamberson's Hardware Price Books

COPYRIGHTED 1885.

LARGE SIZE FOR OFFICE USE.

6x9½ Inches, 500 Pages.

Bound in Leather, Price, \$8.00

Pocket Edition.

4x7 Inches, 250 Pages.

Bound in Leather, Price, \$4.00.

Sent postpaid on receipt of price by

DAVID WILLIAMS, Publisher & Bookseller,
96-102 Reade St., New York.



Diamond Cycle Wrench,

WITH SPOKE GRIP ATTACHMENT.

All Steel, Drop Forged, Case Hardened. Lightest, neatest and strongest. Weighs 5½
ounces, 4¾ in. long. Adjustment 1¼ in. Write for prices and descriptive circular.

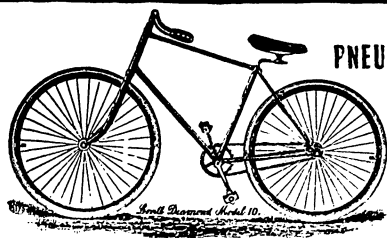
Manufactured
by the

GENDRON IRON WHEEL CO.,

Sold by all Cycle and
Hardware Dealers.
TOLEDO.

EBHARTWELL MFR. OF AXEADZE, PICK, SLEDGE, HATCHET, HAMMER, FOR EXPORT AND HOME USE. 15 YEARS EXPERIENCE. SEND FOR PRICES. OHIO. \$170 GALV.

Lovell Diamond Cycles



HIGHEST GRADE.
PNEUMATIC, CUSHION AND SOLID TIRES.
FOR LADIES AND GENTLEMEN.

MANUFACTURED BY
John P. Lovell Arms Co.

BOSTON, MASS.
CYCLE CATALOGUE FREE.

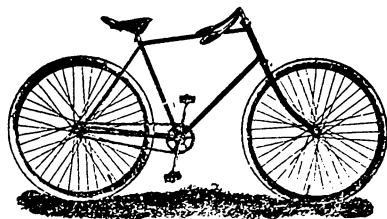
WESTERN WHEEL WORKS.

BICYCLE

MANF'TRS

From \$20

to \$135.



MOST COMPLETE LINE MADE.

OFFICE AND FACTORY:

Wells, Schiller and Sigel Sts., and N. Park Ave., Chicago, Ill., U.S.A.

A Wheel



Properly Designed,
Practically Made,
Combining Strength,
Durability and
Perfect Qualifications.
Such are the

S
O
L
D
S
I
G
H
T.

Dauntless

SICKELS, SWEET & LYON,

Wholesale Hardware.

Office, 35 Barclay St. Warehouse, 40 Park Place, New York.

N. Y. AGENTS FOR

WINSLOW SKATES.

Eagle Files.

Union Steel Screw Co.'s Screws.

Orders for Skates should be placed early. Shipments from factory or New York as preferred.

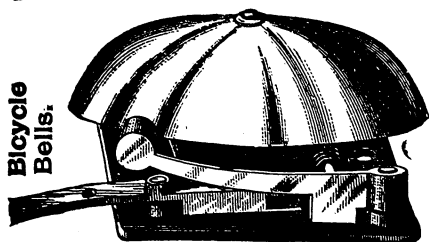
Fall Catalogue No. 6 Issued September 1st.

SICKELS, PRESTON & NUTTING CO.,

Wholesale Hardware and Tinnery's Stock.

N. Y. Office as above.

DAVENPORT, IOWA.



Bicycle Bells.

BEVIN BROS. MFG. CO., Easthampton, Conn.
Manufacturers of

Sleigh Bells, House Tea, Hand, Gong Bells, &c.



Bicycle Locks.
Bicycle Bells.

Especially Low Prices.

We manufacture hardware specialties of all descriptions to order.

HAINES & ZIMMERMANN, 407 Cherry St., Phila.

Yacht and Boat Hardware.

L. W. FERDINAND & CO.,

BOSTON, MASS.

Send for 212-Page Catalogue.



To Make a Bull's Eye

In Your Business or at the Range?

If you deal in ARMS or AMMUNITION or shoot a Rifle, Pistol or Shot Gun, you will make a HIT by sending for the IDEAL HAND BOOK.

IDEAL MFG. CO., New Haven, Ct., U. S. A.

Please mention The Iron Age when you write.

The Henry C. Hart Mfg. Co.

DETROIT, MICH.,

MANUFACTURERS OF

HARDWARE SPECIALTIES, Toy Banks, Etc.

B
I
G
G
E
S
T



B
E
S
T

JUNIOR Retail for . . . 25 cts.
NATIONAL Retail for . . . 50 cts.
IMPERIAL Retail for . . . \$1.00.

The Largest Combination Lock Banks for the Money on the Market.

20 OTHER STYLES.

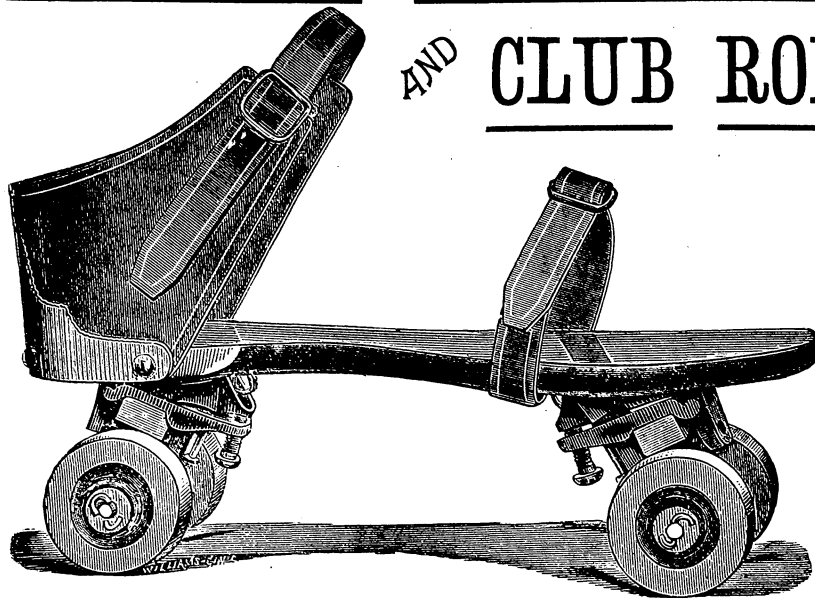
SEND FOR CATALOGUE.

IF YOU WANT THE BEST
FOR CATALOGUE & PRICES.
THEIR MAKE IS EQUAL TO ANY OTHER.
IF NOT SUPERIOR
TO ANY OTHER.
HAVE BEEN IN BUSINESS SINCE 1840.

IF YOU WANT THE BEST
FOR CATALOGUE & PRICES.
THEIR MAKE IS EQUAL TO ANY OTHER.
IF NOT SUPERIOR
TO ANY OTHER.
HAVE BEEN IN BUSINESS SINCE 1840.

IF YOU WANT THE BEST
FOR CATALOGUE & PRICES.
THEIR MAKE IS EQUAL TO ANY OTHER.
IF NOT SUPERIOR
TO ANY OTHER.
HAVE BEEN IN BUSINESS SINCE 1840.

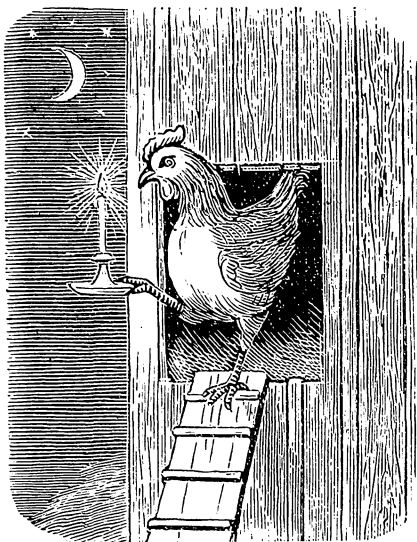
HENLEY'S CELEBRATED RINK AND CLUB ROLLER SKATES.



A full, new and complete stock of Roller Skates, Skate Repairs and Rink Supplies. Address for 80 page catalogue and prices,

M. C. Henley,

RICHMOND, IND.



No, we do not

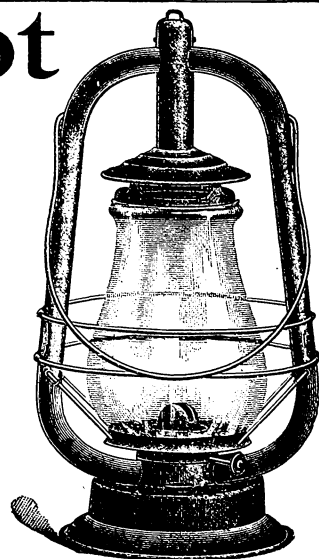
Cackle, but we do let our light so shine that the trade need make no mistake. Write for prices. Surprise Tubulars better than ever. Surprise Dash has no equal. Standard Dash cheapest in the market. Crescent Side Lamps away down. We are sole manufacturers of Surprise Tubulars.

OHIO LANTERN CO.,
TIFFIN, OHIO.

W. W. PRYOR & CO.,

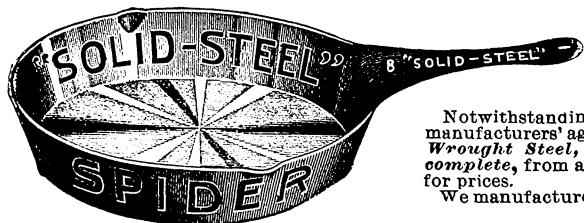
81 Chambers St., New York, Eastern Agents.

A full line of samples can be seen and the trade supplied at factory prices.



SURPRISE TUBULAR.

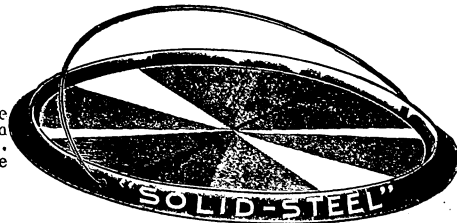
"SOLID-STEEL" SEAMLESS HOLLOW WARE.



No Seams, no Rivets in "Solid-Steel" Ware.

BRILLIANT FINISH.

Notwithstanding the claims made by some manufacturers' agents, our spiders are made from Wrought Steel, Without Seams or Rivets. complete, from a single piece of metal. Write for prices. We manufacture our own goods.



Made either with Balls or Solid Handles.

The Cleveland Stamping & Tool Co., Cleveland, O.

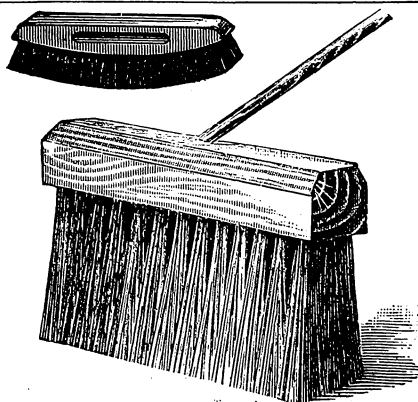
We do Light and Heavy Stamping and Blanking. Also build Dies and Stamping Machinery.

**SHEETS,
COOKING UTENSILS,
MEDALS,**

Sheets and Rivets for Boats
and Coffins.

Bars for Horse Shoes.

**ILLINOIS PURE ALUMINUM CO.,
LEMONT, ILLINOIS.**



Joseph Lay & Co.,
RIDGEVILLE, - IND.

MANUFACTURERS OF

Steel Wire Brooms,

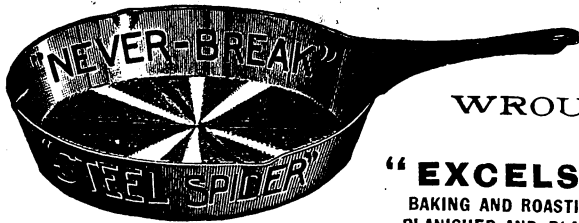
CASTING,

Butcher Block, Flue, and all
kinds Wire Brushes.

MOULDERS' BRISTLE BRUSHES.

Heavy and Light Shop Brooms, Push
Brooms of every kind. Street
Sweeper Rolls refilled.

CORRESPONDENCE SOLICITED.



"MIRROR POLISH," the only Perfect Plain Steel Finish.

"NEVER-BREAK"

WROUGHT STEEL COOKING UTENSILS.

MIRROR POLISHED-TINNED-PORCELAINED.

"EXCELSIOR"

BAKING AND ROASTING PANS,
PLANISHED AND PLAIN STEEL.

"PURITAN"

COOKERS, COFFEE POTS AND
OTHER SPECIALTIES.

"IDEAL"

BRASS, BRONZE, NICKEL UM-
BRELLA STANDS, CUSPIDORS,
ETC., ETC., ETC.

THE BRONSON SUPPLY CO.,
CLEVELAND AND NEW YORK.



No. 3

Globe Street Lamp.

Light your Streets and Driveways.

The S. G. & L. CO.

Tubular Globe Street Lamp

IS THE Best Street Lamp Manufactured.
Equal to the best Gas Light.
Will not Blow Out in the Strongest Wind.
Will not Smoke.
Will not Freeze.
Automatic Extinguisher.
Outside Wick Regulator.
Will Burn Four Hours for One Cent.

MANUFACTURED BY

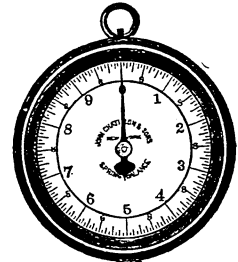
STEAM GAUGE AND LANTERN CO.,

SYRACUSE, N. Y.

Western Branch, 25 Lake St., Chicago, Ill.

John Chatillon & Sons,

85, 87, 89, 91, 93 CLIFF ST., NEW YORK.



ESTABLISHED
1835.

SEND FOR
PRICE LIST.



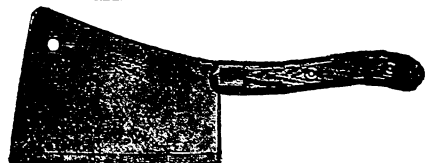
MANUFACTURERS
OF

SCALES

—AND—
BUTCHER TOOLS.

Sole Agents for

Foster Bro.'s Butchers' Cutlery.



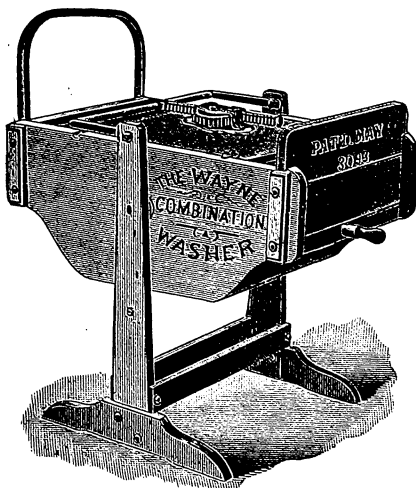
John Chatillon & Sons, N. Y.

GENUINE **MARTY** RAT AND
MOUSE TRAPS
ALWAYS IN STOCK.



THEY DO THE WORK.
Orders solicited. Prices on application.
BURDITT & WILLIAMS,
20 Dock Square, Boston, Mass.
—SOLE AGENTS AND IMPORTERS.—

A SMALL PANIC



Has been created among makers of Washing Machines since the introduction of "The Anthony Wayne Combination." Why? The reason is very plain. It's the only washer that has all bad features eliminated and that embodies all the good ones. It washes clean, first, last and all the time, with the least labor. To handle it is to sell it. Particulars about it and our others free. Write.

SEND FOR SAMPLE.

THE ANTHONY WAYNE MFG. CO., - FORT WAYNE, IND.



DAIRY PAIL



MILK PAN



WASH BASIN.



CUSPIDOR



WATER PAIL



DAISY SPITTOON



BOWL PITCHER



KEELER



SPITTOON



CHAMBER PAIL



SLOP PAIL



COMMODE PAIL



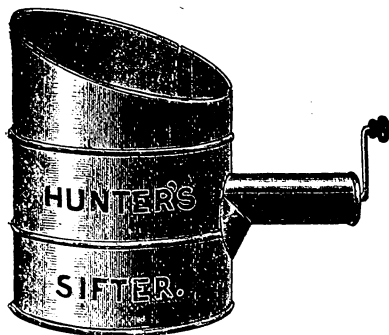
SLOP JAR



WASTE BASKET

WATERPROOFED through SOLID. Light, CLEANLY, Handsome, DURABLE. Cheap as a GOOD ARTICLE can be made. ORNAMENTAL as well as USEFUL. Sold DIRECT TO THE TRADE. In this ARTISTIC age no dealer can afford to be without DECORATED FLAX FIBER WARE, bearing above trade-mark and made only by above Company.

The Original Hunter Sifters



are now sold at the same price as any other Sifter of *equal merit*. "Equal merit;" there's the rub. They can be imitated to be sure, but then—oh! well, what's the use of talking, you are not getting what you pay for.

—ADDRESS—

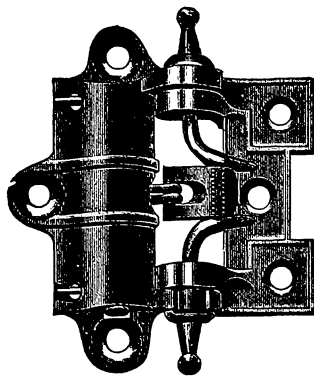
The FRED J. MEYERS MFG. CO.

COVINGTON, KY.

F. J. MATTISON, Eastern Agent
NEW YORK.

NEW IDEA SPRING HINGE

Holds the door strongest when closed.



Resistance gradually decreases in opening

and increases in closing the door.

A covered (patented) hold-back Spring Hinge. Full particulars, free Sample and Prices by mentioning this paper.

STOVER MANUFACTURING CO.,

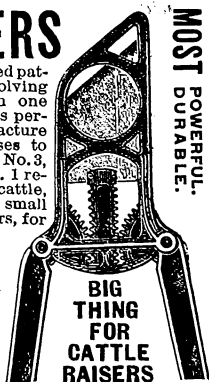
145 River St., Freeport, Ill.

DEHORNERS

Newton's lately improved patent dehorning knives, revolving and sliding shears, each one making a draw cut. Cuts perfectly smooth, does not fracture the head or horns, causes to heal quick No. 1 miniature No. 3, for calves only, \$4.00. No. 1 revolving shears, for young cattle, \$6.00 No. 2 sliding shears, small \$8.00. No. 3 sliding shears, for young or old cattle, \$10.00. Each one fully guaranteed. Any one can use them. Ask your hardware dealer for them, or write,

H. H. Brown Mfg. Co.

Sole Manufacturers,
DECATUR, ILL.



MOST POWERFUL.
BIG
THING
FOR
CATTLE
RAISERS

American Stamping Co.,

Manufacturers of

All Kinds of Tinware and Sheet Metal Goods.

N. Y. Office and Salesroom, 104 & 106 John St.
Factory, 103 to 119 N. 3d St., Brooklyn, E. D., N. Y.

THE QUEEN ANNE SCREEN CO.,
Burlington, Vt.,

MANUFACTURERS OF

Improved Adjustable Window Screens.
THE QUEEN ANNE. With box panels; the only screen made and finished alike on both sides.
THE EUREKA. The best cheap extension screen on the market.
SCREEN DOORS. Finished all ready to hang
Sticks, Corners, Improved Frames, &c.
Write for circular and Price-list.



C. W. DUNLAP,
MANUFACTURER OF A LARGE VARIETY OF SUPERIOR QUALITY HOUSEKEEPER'S
HARDWARE AND GARDEN TOOLS.
ILLUSTRATED CATALOGUE AND PRICE LISTS TO TRADE.
P. O. ADDRESS . . . BOX 2703 NEW YORK.



**HENRY'S
GRAPE SHEARS**

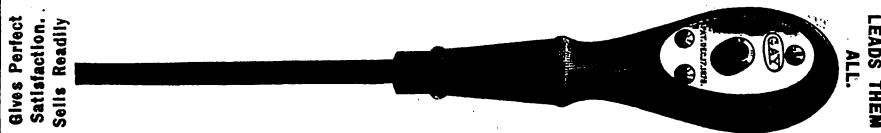
Increased demand and increased facilities for production enable us to make lower prices than ever before. Holds firmly anything it cuts and can be instantly released by the operator. Samples by mail to the trade at wholesale prices and postage.

BEST MATERIAL. WELL MADE. CHEAP.

The J. T. HENRY MFG. CO. Hamden Conn., U. S. A.

THIS IS THE "OLD RELIABLE" DOUBLE ACTION
RATCHET SCREW DRIVER.
One of the very Best Tools Ever Invented.

It Combines Greater Strength, Convenience and Durability than was ever obtained in a Common Driver



Sold by all First-Class Dealers. Send for Price-List.
Manufactured by **GAY & PARSONS,** - - Augusta, Maine, U. S. A.
JOHN H. GRAHAM & CO., Agents, 113 Chambers Street, New York.

The Enterprise M'f'g Co., of Pa.

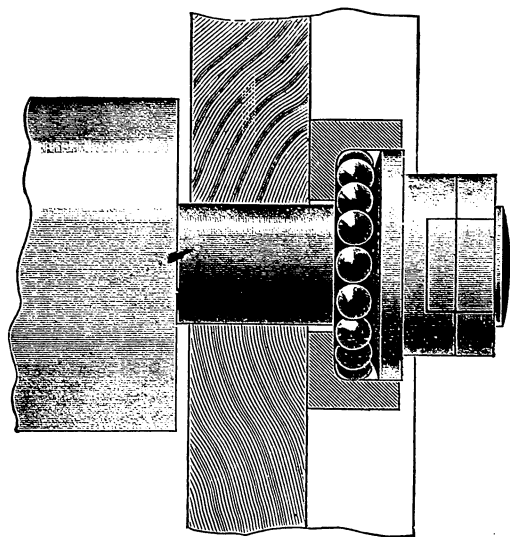
Third and Dauphin Streets,
Philadelphia.MEAT
ChoppersEnough
said!

SOLD BY ALL HARDWARE DEALERS. SEND FOR CATALOGUE.

Dead Patents Create Competition and Improve Goods.

OUR Flour Sifters are made from Better Tin Plate,
are larger, and are models of Workmanship.We manufacture the most complete line on the
market and make a specialty of**'THE MONARCH.'***The only Sifter made that has a bottom. Before buying get
our prices and circulars.*

W. H. SILLS, Manufacturer, 86 Lake St., Chicago.

**SOMETHING NEW.**
A BALL BEARING WRINGER.**THE CLEVELAND.**

Patent Applied for.

Only Successful one Ever Invented.

TURNS SO EASILY CAN BE OPERATED BY A CHILD.

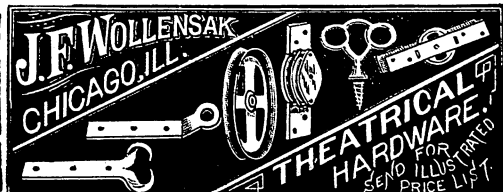
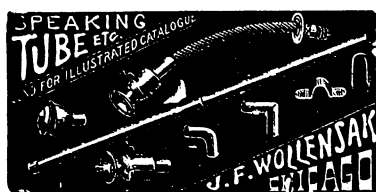
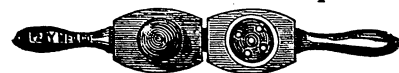
All wearing parts revolve upon balls.

OTHER PARTS OF THE ORDINARY MACHINE IMPROVED.

STEEL SPRING AND CHANGEABLE APRON.

Altogether finest machine on the market. Remember this
is not a roller bearing, but is made with balls in the bearings
like bicycles, which we also manufacture.**FULLY GUARANTEED****The Peerless Manufacturing Company,**

Cleveland, Ohio.

**Porcelain Lined Lemon Squeezers**Best Common Mouse Traps, Steak Hammers,
Boot Jacks, Lap Boards, Beacon Hill Pat. Mouse
Traps, Mallets, Bung Starters, Hand Screws.
Ripley Mfg. Co., Unionville, Conn.

The Sun Manufacturing Co.

Successors to the Jno. M. Waddel Mfg. Co.,

ARE SOLE OWNERS AND MANUFACTURERS OF

**Waddel's Improved Coffee Mills,
Cathedral Gong Money Drawer and Surprise Rat Traps.**
Beware of Infringements.—We will protect our Patents.

"THE 'SUN' ONLY, SHINES FOR ALL."

A New Name, A New Reputation,

A New Line of Coffee Mills

That under the SUN Brand shine as leaders.

RAPID GRINDERS that will STAND THE WEAR.

STEEL ALLOY BUHRS,

A metal of recent discovery for this purpose used solely and only by the SUN. Warranted to outwear, outgrind and outsell any Coffee Mill ever put on the market.

We Challenge a Competing Test for Rapid Grinding and Wearing Surface.

Our New Line bears the Sun Trade Mark and is labeled Steel Alloy Buhrs.

Write for Our Catalogue and New Prices.

Order a Sample Mill.

THE SUN MANUFACTURING CO.,
Greenfield, Ohio, U. S. A.,

MANUFACTURERS OF

Cash Registers, Money Drawers, Coffee Mills and Wooden Ware Specialties.



W. H. Neff, Cowan, Indiana. Says

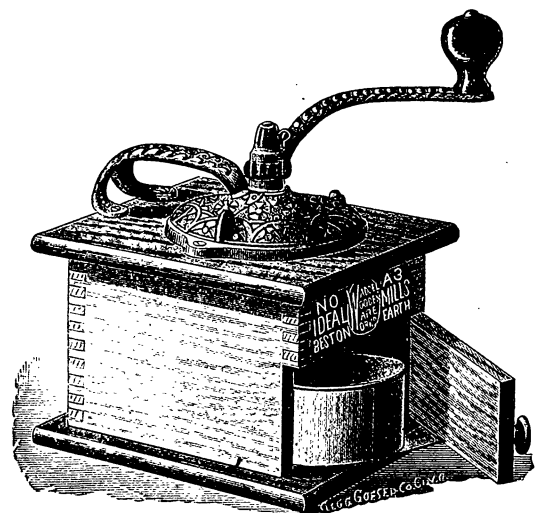
The = Perfection = Washer

is the best on earth. Crowned with laurels wherever introduced. Do you want a Washer for your own use, or do you want to handle the best Washer in the world? If you do, get the best.

It is conceded to be the best by thousands of families who are using them to their entire satisfaction. So simple and easy to operate, a child ten years old can wash with it. Yet more durable than any washer in the market. It has a Steel Bottom, Metal Catches to hang the rubber on, Rubber Packing between the bottom and sides, which relieves the strain on the bottom by the contraction and expansion of the sides. It is handsomely painted, perfect and complete in every particular. The above statements are facts, and a glance at the Washer will convince any one. For further particulars, call on or address

W. H. NEFF, Manufacturer.

"BIG W. W. W. W. FOUR."



A certain company are claiming to be "sole manufacturers of Waddel's Coffee Mills," ("If you see it in the sun its so"). The statement is designed to mislead the trade. The old line of Waddel's Coffee Mills, which have been on the market the past five years, are not manufactured by us. We are making a new line of Coffee Mills which are guaranteed to grind twice as fast as similar goods, and each mill is labeled under a trade-mark "Ideal Coffee Mills manufactured by Waddel Wooden Ware Works; best on earth." Specify the new goods and order "Ideal Mills," and our word for it, you will not make a mistake. Address plainly

Waddel Wooden Ware Works or "4 W.,"

Greenfield, Ohio,

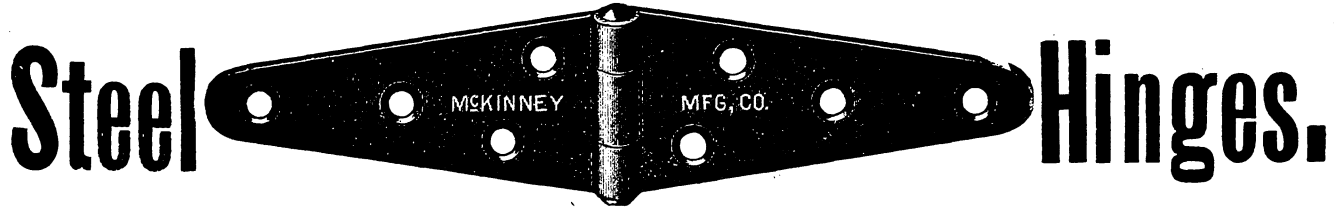
MANUFACTURERS OF

CASH REGISTERS, MONEY DRAWERS, COFFEE MILLS, RAT TRAPS and NOVELTIES.

WE CLAIM

That one pair of our Celebrated Steel Hinges will outwear two pair of the Flimsy Invention now being forced upon the attention of the trade.

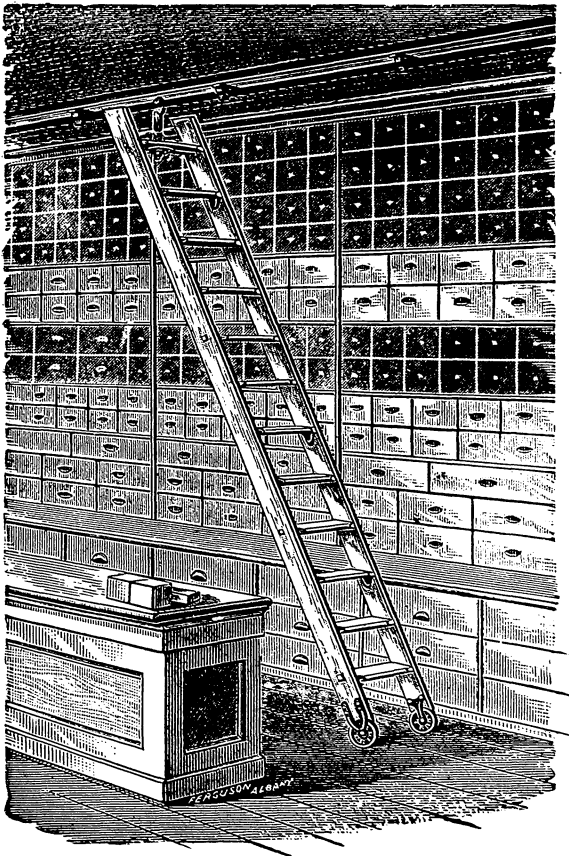
McKINNEY MFG. CO., ALLEGHENY, PA.



SEND FOR LIST.

"NONE BETTER."

THE "NOISELESS" STORE LADDER.

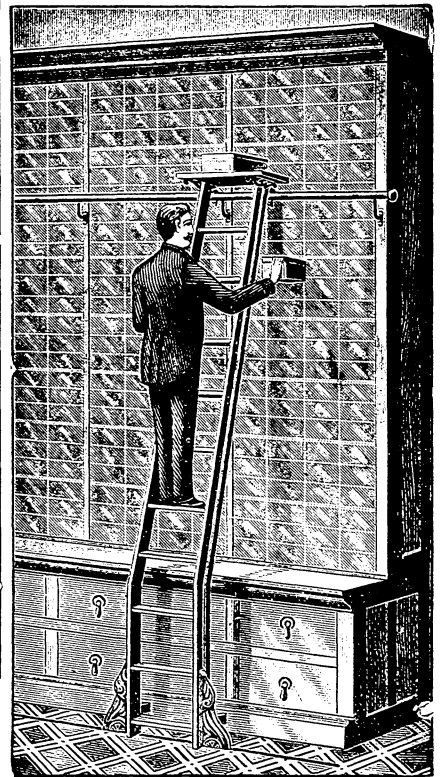


The latest and best. Perfectly noiseless. Neat in appearance.

Manufactured by

M. CROISSANT,

ALBANY, N. Y.



FLOOR TRACK BICYCLE LADDER.

No other Ladder Service can approach the "Bicycle" in ease and convenience of operation. Compared with others they work like a bicycle beside a lumber wagon.

Can be applied to any kind of shelving made.

See this space next week for other styles.

Send for Illustrated Catalogue and prices to

THE BICYCLE STEP LADDER CO.,
50 State street, Chicago, Ill.

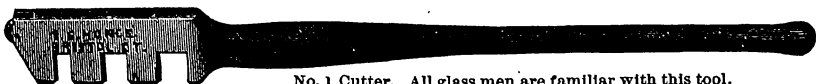
All Dealers Should Send for Our
OCTOBER 1st PRICE-LIST

—: AND:—

NEW DISCOUNTS.

COLBY WRINGER CO.,
MONTPELIER, VT.

MONCE'S NOVELTY GLASS CUTTERS. — INTERCHANGEABLE LOCK STENCILS



No. 1 Cutter. All glass men are familiar with this tool.

S. G. MONCE, - - BRISTOL, CONN.

HARDWARE DEALERS

CAN RECOMMEND THE

**CHAMPION METAL WINDOW
SASH CHAINS**

to their customers as a reliable substitute for Sash Cords, very strong and lasting (some in daily use ten years), and gives thorough satisfaction wherever used. The patented attachments are very simple and can be applied to any window.

MANUFACTURED ONLY BY

"THOMAS MORTON,"

65 Elizabeth Street,

Write for Prices.

NEW YORK.

P. & F. CORBIN,

New Britain, Conn.

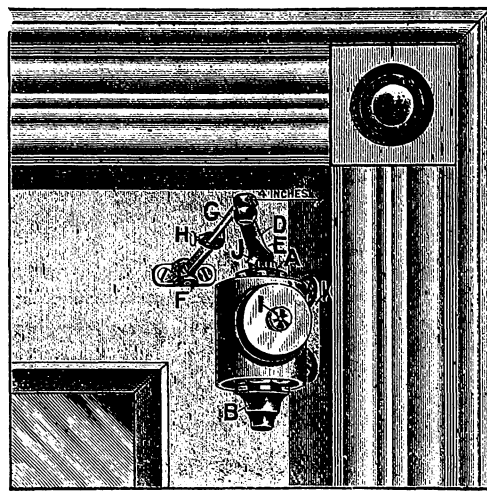
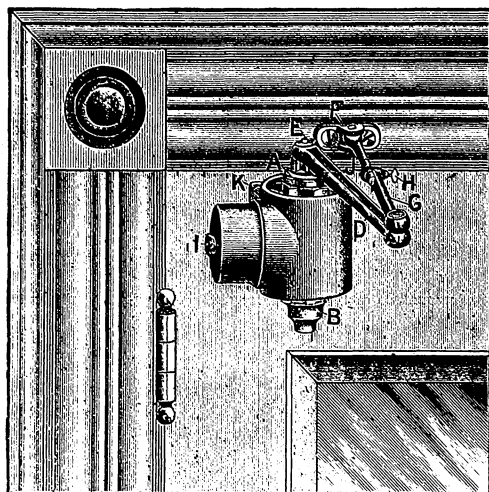
New York.

Philadelphia.

Chicago.

—) MANUFACTURERS OF (—

Easily
Adjusted
and Adapted
for all
Requirements.



Looks Well,
Acts Well,
Wears Well.

LIQUID DOOR CHECKS AND SPRINGS,

Fine Builders' Hardware. Wood AND Machine Screws.

Catalogues and Prices Furnished on Application.

Reliable Torches are
what you want.



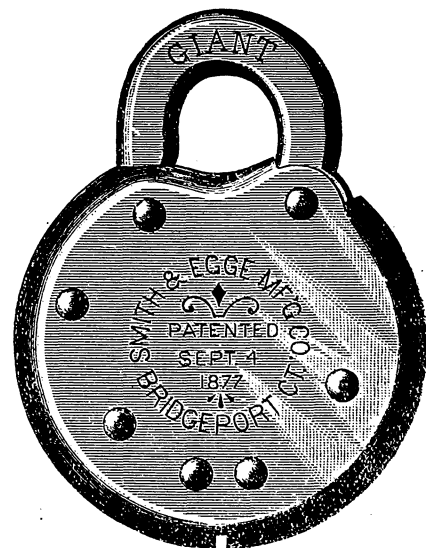
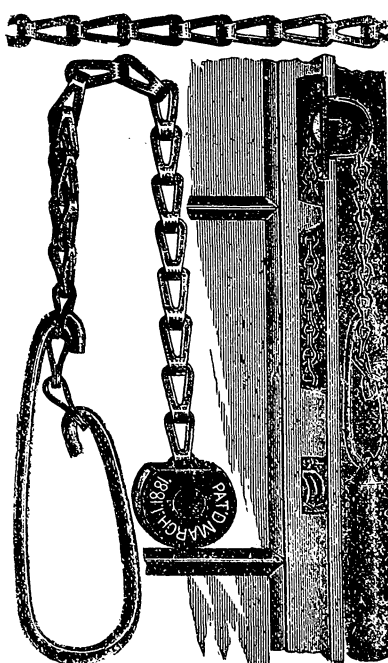
Made either for Oil or
Gasoline.



These Torches are particularly adapted for use in Factories, Foundries, Machine Shops, Rolling Mills, Blacksmith Shops, Warehouses, &c. They make a strong white light, are free from smoke and are not affected by wind or rain. They are convenient and portable. These Torches can be run at an expense of about one-half cent to one cent per hour, burning a bright, steady light which is ten times greater than the light of an ordinary gas burner.

Write us for prices. A liberal discount given to the trade. Manufactured by
THE SCHNEIDER & TRENKAMP CO.,
Nos. 479 to 497 Case Ave., Cleveland, Ohio

THE SMITH & EGGE MFG. CO., BRIDGEPORT, CONN.



THE GIANT PADLOCK.

Centennial Award "Superior in Every Respect."

This is one of the best selling locks in the market, and affords the dealer a large profit. It is thoroughly and strongly made—of the best material—very handsome in appearance, and every Lock is warranted. Orders solicited.

THE GIANT METAL SASH CHAIN

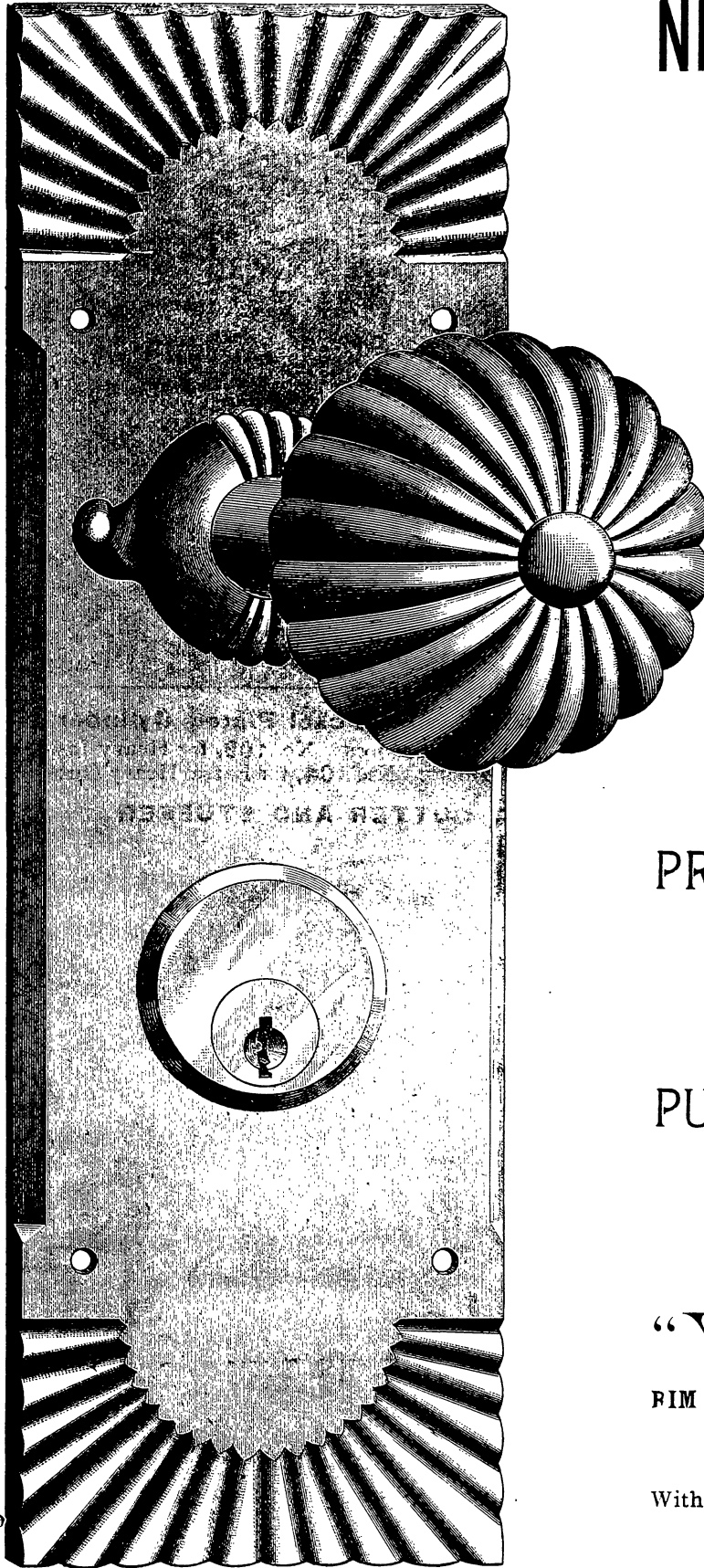
is a substitute for cord in hanging weights to windows. It is manufactured by us only, and by automatic machinery, patented and owned exclusively by ourselves, and whereby we secure uniformity of construction and quality. We have been to great expense in producing a metal having all the qualities and conditions requisite for making suitable chain for this purpose, and to prevent other chain of the same pattern of link and of the same general appearance, but made from an inferior metal, being offered as the same thing, we patented the word "Giant" as a Trade-Mark, as applied to either metal or chain. Trade-Mark Registered April 16, 1878, and October 22, 1878, and our metal is therefore known in the market as "Giant Metal," and our chain as "Giant Metal Sash Chain."



WM. KROGSRUUD,
Engraver and Die Sinker,
61 Fulton St., N. Y.
Manufacturer of
STEEL STAMPS
For Every Purpose.
Steel Letters and Figures.
Burning Brands, Stencils,
&c. Send for Illustrated
Catalogue.



SAFEST AND BEST.

“VASSAR” LOCKS**A
S
S
A
R”****L
O
C
K
S****NEW****ARTISTIC
DESIGNS**

—IN—

**FINE
BRONZE
GOODS**

—FOR—

**PRIVATE
RESIDENCES**

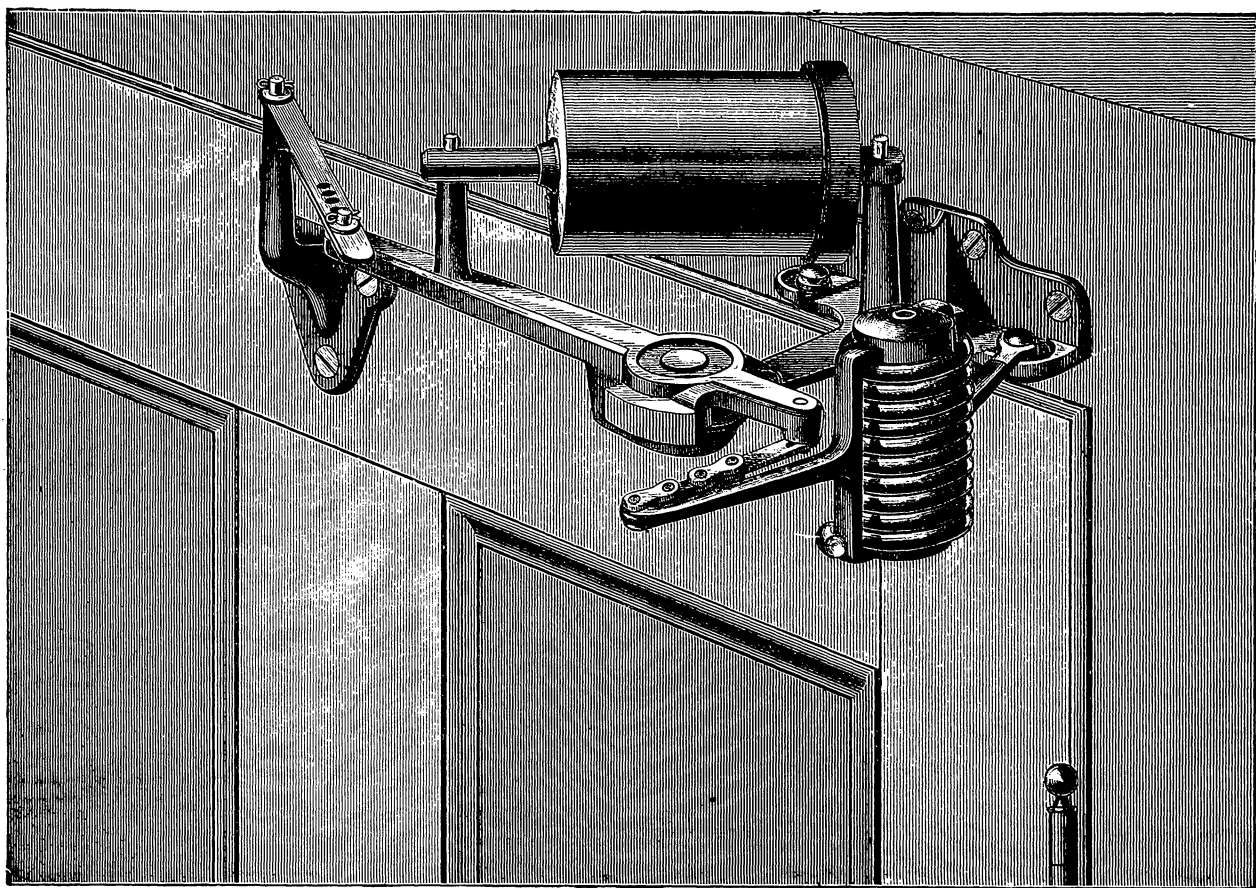
—AND—

**PUBLIC
BUILDINGS.****“VASSAR”****RIM NIGHT LATCHES.****RIM DEAD LOCKS.**With Patent Self-Adjusting Con-
necting Spindle.

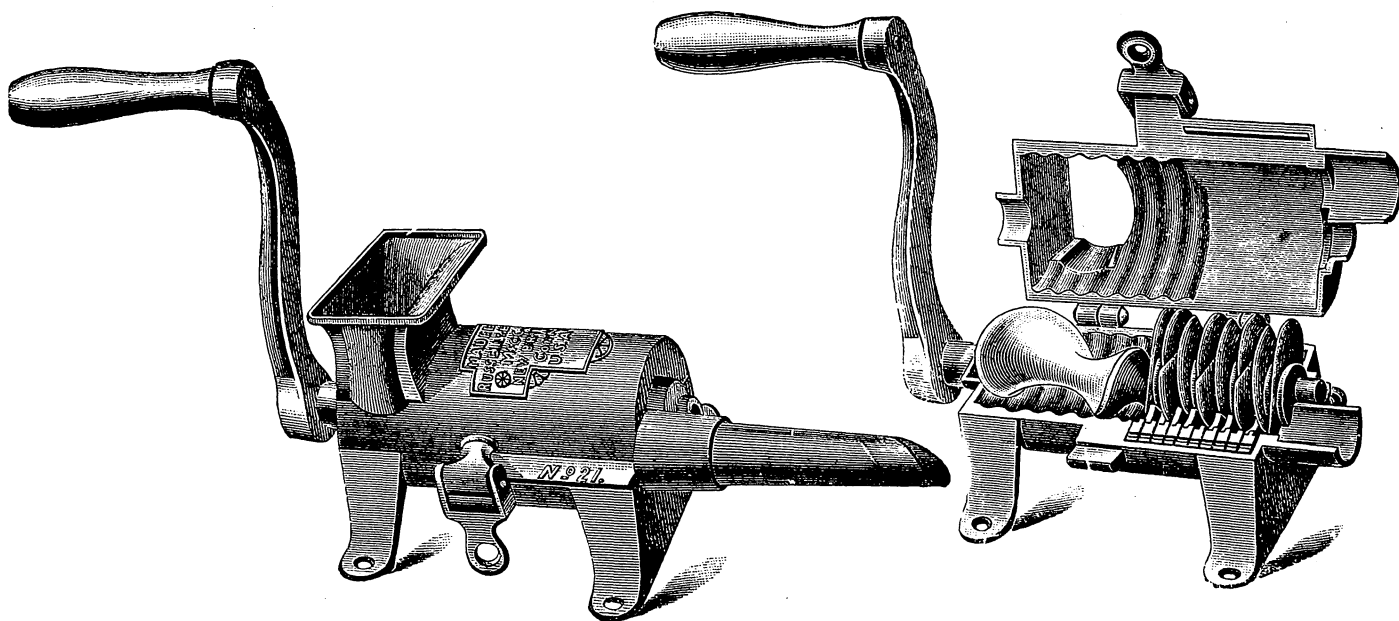
—) MANUFACTURED BY (—

READING HARDWARE CO., Reading, Pa.**NEW YORK.****PHILADELPHIA.****CHICAGO.**

TEMPORA MUTANTUR ET NOS MUTAMUR IN ILLIS.

"HOME" DOOR CHECK AND SPRING COMBINED.**"KAHALA" BRONZE, with Nickel Plated Cylinder.**

No. 100, for Screen Doors. No. 101, for Light Inside Doors No. 102, for Heavy Inside and Light Outside Doors. No. 103, for Heavy Outside Doors. No. 104, for Extra Heavy Outside Doors

"HOME" MEAT CUTTER AND STUFFER.

No. 21.

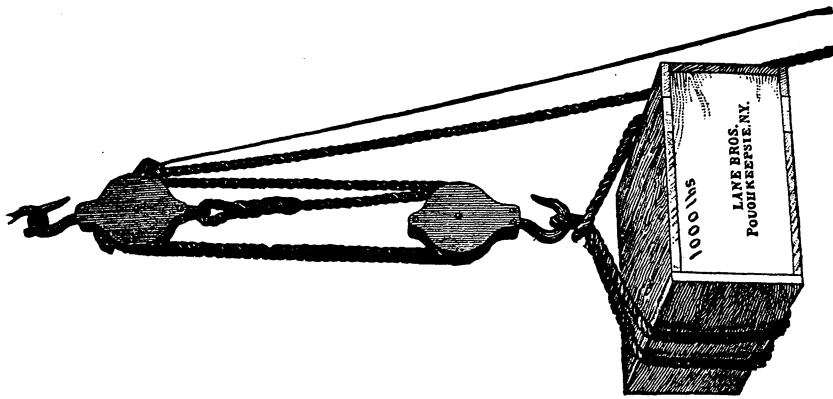
Nos. 1 and 21. Open.

PATENTED.**WILL CUT THREE POUNDS OF MEAT PER MINUTE.**

No. 1, Japanned, 6 inch Cylinder. No. 2, Japanned, 6 inch Cylinder. No. 21, Galvanized, 6 inch Cylinder.

This Meat Cutter will CUT meat more rapidly, and is easier cleaned than any meat cutter made, and is the only one that will cut satisfactorily both raw and cooked meat.

RUSSELL & ERWIN MANUFACTURING CO., **SOLE MAKERS,**
New Britain, Conn.; New York, Philadelphia, Baltimore, London.



LANE'S SELF-LOCKING TACKLEBLOCKS,

Anti-Friction Steel Bushings,

Holds the load at any point, and always sure.

SEND FOR CIRCULAR.

For sale by the Hardware trade.

—MANUFACTURED BY—

LANE BROS.
POUGHKEEPSIE, N. Y.

He had in his possession 55 skeleton keys
which the police claim would open any door.
—Chicago Tribune.

You are selling that kind of a lock every day and

your customers think you are selling the best the market affords.

ARE YOU SELLING the best the market affords?

The Craig Locks are guaranteed Sneak Thief Proof.

Send for Catalogue.

KEYLESS LOCK CO., I. A. 197 So. Canal St., Chicago, Ill.

PATENT PERFECTION PADLOCK

Eight Tumblers. Key Turning Both Ways.

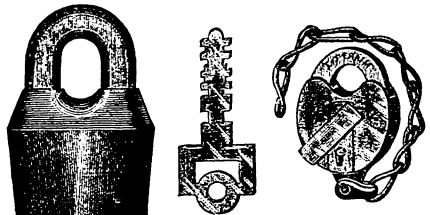


Sizes; $\frac{1}{4}$ inch to $2\frac{1}{2}$ inches; of cast bronze. Defies competition for quality and price. No steel or iron used, cannot rust, cannot be picked. Also, $\frac{1}{4}$ and $\frac{3}{4}$ inch Padlocks, opened with a common pin, in brass and nickel; for cats and small dogs. The best Railroad Switch and Car Lock in the world. Adopted by the United States Treasury for bonded warehouses.

AMES SWORD CO., Chicopee, Mass.

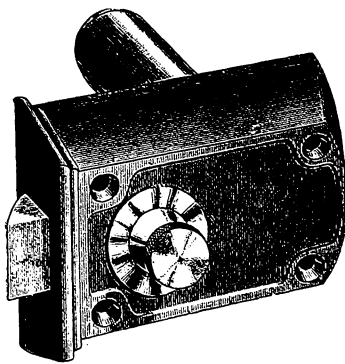
Send for Price Lists and Circulars.

ESTABLISHED 1879.
KEYSTONE LOCK WORKS,
E. T. FRAM, Lancaster, Pa., U. S. A.



Originators, designers, patentees and manufacturers of all the leading popular styles of **PADLOCKS**, Key-Locking Scandinavian with our patent Inter-Locking Tumblers; the only reliable lock of this style ever made. **SELF-LOCKING** Scandinavian of the highest type of perfection. Dust Proof Railroad, Freight Car and Switch Padlocks. Brass, Bronze, Steel and Malleable Iron Padlocks for all purposes and in all finishes. 131 different kinds. Write for our new 100-page catalogue.

SURPLESS, DUNN & ALDER, General Agents,
97 Chambers St., NEW YORK.



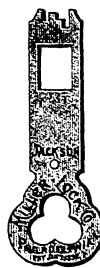
"JACKSON" NON-PICKABLE ALL BRONZE NIGHT LATCH.

Made also of **JAPANNED IRON** with **BRONZE BOLT** and **ESCUTCHEON**.

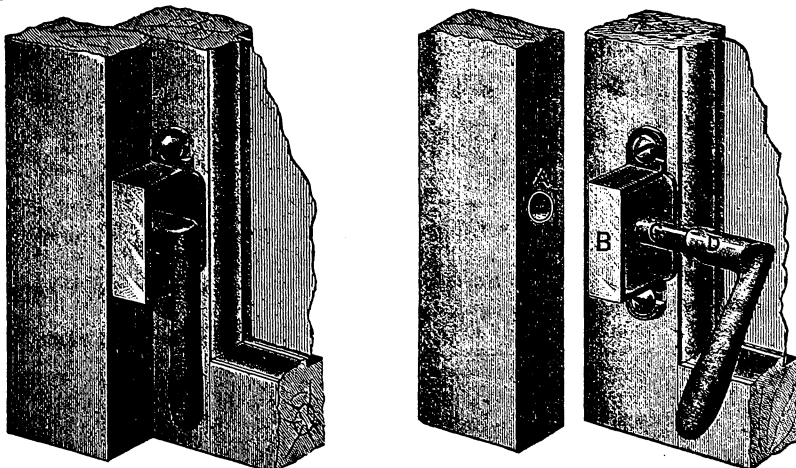
Reversible. Adjustable. **3 Plated Steel Keys**. No springs, except the bolt spring. **Awarded Best Prize** at World's Fair, Chicago. Undoubtedly the best latch extant. All are fully guaranteed. We employ no travelers and no agents. Ask your **Jobber** for our goods. Let us know if our **Cat. No. 11** is not on your file.

MILLER LOCK CO.,

4515 Tacony Street, PHILADELPHIA, PA



DOLBER'S SASH FASTENER.



Patented August 1, 1893.

The best device ever invented for fastening outside, storm or double windows, and all similar purposes. **Saves Time, Labor and Expense.**

F. V. WOOSTER, Manufacturer,

66 Beverly St., BOSTON

SIMPLEST IN CONSTRUCTION.
EASIEST FITTED.



**Cheapest and Best
Balance Made.**

WRITE FOR CATALOGUE.

The Vanderbilt Sash Balance Co.,
CANANDAIGUA, N. Y.

General Agents, Harmon & Dixon, 118 Chambers St. New York.

C. H. WOLFF,

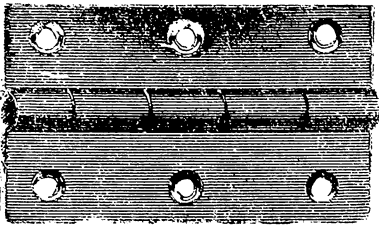
177 William St., N. Y.

STEEL ALPHABETS

STEEL NAME STAMPS
BURNING BRANDS

STENCIL DIES.

Send for Catalogue.



Cast Brass Butt Hinges

IN STOCK AND FOR SALE BY

W. & J. TIEBOUT,

Nos. 16 & 18 Chambers Street, New York,

MANUFACTURERS OF

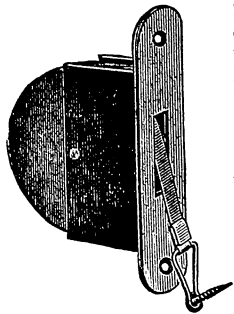
**BRASS, GALVANIZED & SHIP CHANDLERY
HARDWARE.**

A Well Balanced Sash

IS LIKE,

A Well Balanced Business Man,

gives satisfaction to those who are brought in contact with them. Don't be inveigled into buying anything called Sash Balances that have no record. Made from light cast iron. Ask your Hardware dealer for Pullman Steel Frame Sash Balance. Warranted 15 years. Only Steel Frame Sash Balance in the world.

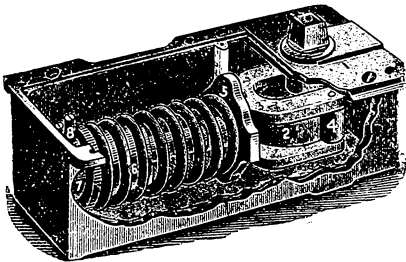


**SIMPLE, CHEAP
AND DURABLE.**

PULLMAN SASH BALANCE CO., Rochester, N. Y.

New York Office, 142 Chambers St.

Chicago Office, 235 Lake St.



CHECKING SPRING HINGES FOR SWING DOORS.

Applied in floor under door. They close the door gently, without noise or violence and stop it at once at the centre. Doors cannot sag, springs do not break or set.

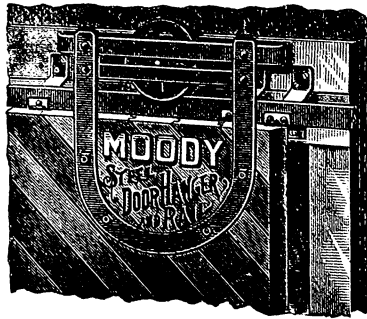
J. BARDSLEY, 149 & 151 Baxter St., New York

Illustrated Price-List on Application.



N. Y. Office, 103 Chambers St., W. H. QUINN, Manager.

VICTOR MFG. CO., Newburyport, Mass. STEEL RAIL.



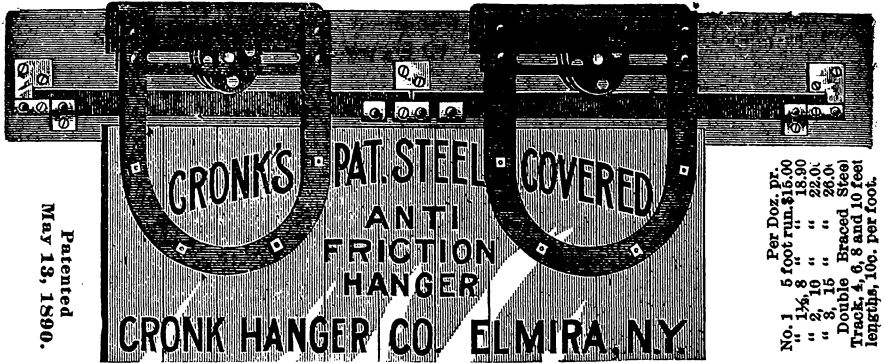
Showing one-half set of hangers attached to door.



The Only Bracing Bracket Made.

PRICE-LIST.

HANGERS.	Per Doz. prs.
No. 5, to run 6 feet, 3 1/4 in. wheel,	\$10.00
No. 6, to run 10 feet, 4 1/4 in. wheel,	15.00
No. 7, to run 15 feet, 5 1/4 in. wheel,	22.00
RAIL, per foot.....	6 1/2 cents



We are the original makers of steel covered hangers and all others are imitations. Beware of infringements, as we shall protect our rights.

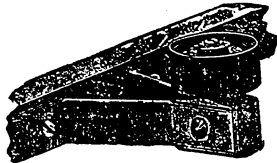
In our Steel Covered Hangers we have all the desirable features of the Best Hangers in the market, and with that we combine the cover for wheels SO NO ICE OR SNOW can reach the wheels, and making this cover as we do, we stiffen it so it is the strongest Hanger in the market, and we believe it is just perfect. Would be glad to have you try a small order and satisfy yourself.

Double-Braced Steel Rail.

PATENTED JUNE 12, 1888.

This rail being double-braced and double-riveted is the strongest rail in the market. Being braced both ways it will not sag. The joint is made so it is perfectly solid. It comes complete and ready for use, requiring only screws and screw driver for any man or boy to put it up in short order. It can be used for any grooved wheel Hanger, and a heavy door will not make it spring or tremble. Guaranteed to hold a door weighing 2,000 pounds, and used in connection with our Anti-Friction Hanger will work perfectly on large or small doors.

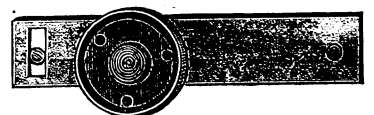
Cronk's Adjustable Stay Roller.



Made of wrought steel strap; cast block with slot adjusted by loosening bolt.

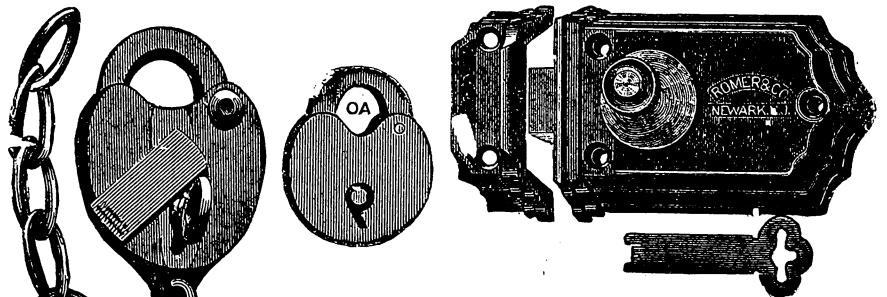
Pacific Coast Agents, CHAS. L. PIERCE & CO., San Francisco, Cal.

Cronk's Inside Adjustable Stay.



Is cheap, simple and durable, and much better than a cleat nailed on the floor for this avoids all friction and leaves no place for dirt to accumulate. \$2.00 per doz. No inside door can be properly hung without this stay.

ROMER & COMPANY, Manufacturers of PATENT JAIL LOCKS, BRASS and IRON PADLOCKS,



Adjustable Door Knobs and Trimmings,
Front Door Handles.

Patent Horizontal Rim Cylinder Reversible Night Latches.

Illustrated Lists sent to the Trade on application.
275, 277 and 279 Passaic St., near Erie and D. L. & W. R. R. Depots, Newark, N. J

Manufacture To Order
SPECIALTIES & NOVELTIES, PATENTED ARTICLES,
HARDWARE GOODS ETC.. SMALL OR FINE MACHINERY.
SEND FOR CATALOGUE - CORRESPONDENCE SOLICITED
OTTO KONIGSLOW CLEVELAND, O.

**BOLSTERS,
REACHES
AXLES,
POLES,**

**GEO. W. HARTZELL.
WHOLESALE
MANUFACTURER.**

**FELLOES,
HOUNDS,
PLANK.**

**GREENVILLE, O.
U.S.A.**

**WRITE FOR
PRICES.**

DOUBLE AND SINGLE TREES.

**RICHARD ECCLES,
AUBURN, N. Y.,**

MANUFACTURER OF

**Finest Carriage Forgings, Coup-
lings, Clips,
King Bolts,
Fifth Wheels,
&c. Manufact-
ure a full line
Special Drop
Forgings.**

Medal Awarded at World's Fair,
Chicago.

Send for New Catalogue for
Season 1893-94.

FROST'S ANTI-RATTLER

Pat. Jan. 20, 1880.

Cut One-half Size.

Sample pair sent to any hard-
ware or saddlery firm by ad-
dressing

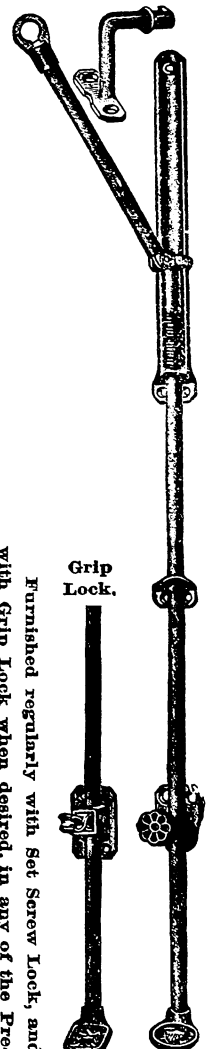
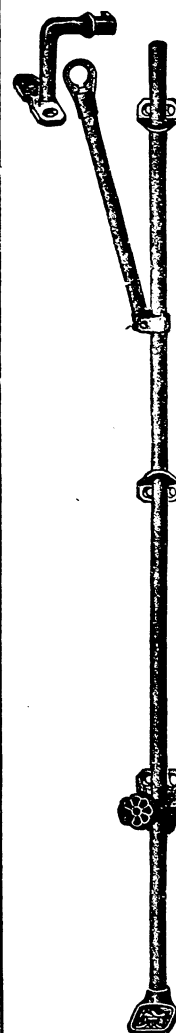
The Frost Thill Spring Co.,
Boston, Mass.



TRANSOMLIFTERS

"EAGLE."

"SHIELD."



Grip
Lock.

Furnished regularly with Set Screw Lock, and
with Grip Lock when desired, in any of the Pre-
vailing Finishes. For Prices, &c., Apply to

**J. F. WOLLENSAK, PATENTEE
CHICAGO, ILLINOIS.**

**WHY USE WOODEN OR HEAVY STEEL BLOCKS
WHEN THE STEEL AND IRON**

TACKLE BLOCKS

—MADE BY—

The Cleveland Block Co.

CLEVELAND, OHIO, U. S. A.,

ARE BETTER IN EVERY WAY.

No waste material. Every ounce of weight in the line of
strength. No clumsy outside straps or bolts. As light as
wooden blocks and vastly more durable. They wear, but never
break. Sheaves interchangeable.

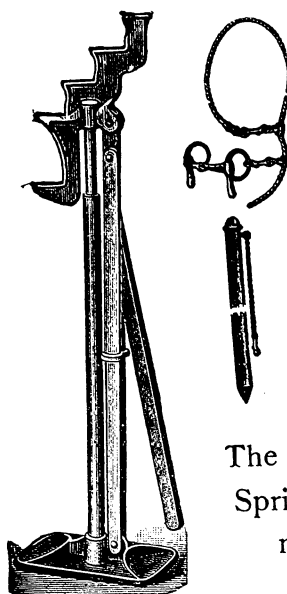
General Agents: Topping Brothers, 92 Chambers Street, New York.
The H. Channon Co., 22 Market Street, Chicago.
New England Agents, - Dodge, Haley & Co., 212 High Street, Boston.

STEEL. WOOD OR IRON
MADE BY
TOLEDO BLOCK WORKS.
511-513-515 Water St., TOLEDO, OHIO,
WILL PROVE SATISFACTORY
TO USER.



COVERT MFG. CO.

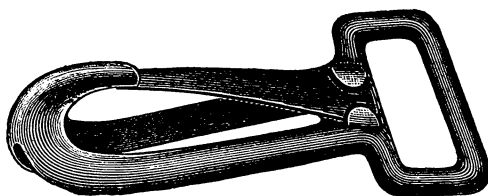
West Troy, N. Y.



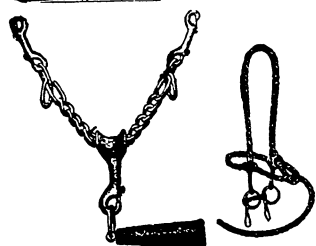
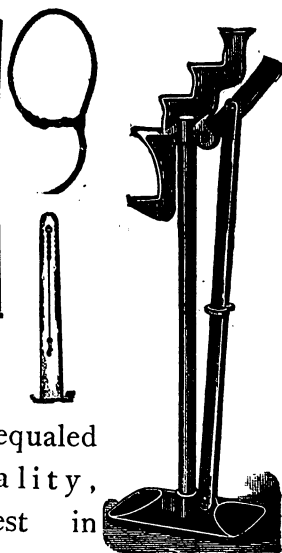
The best Steel
Spring Snap
made.



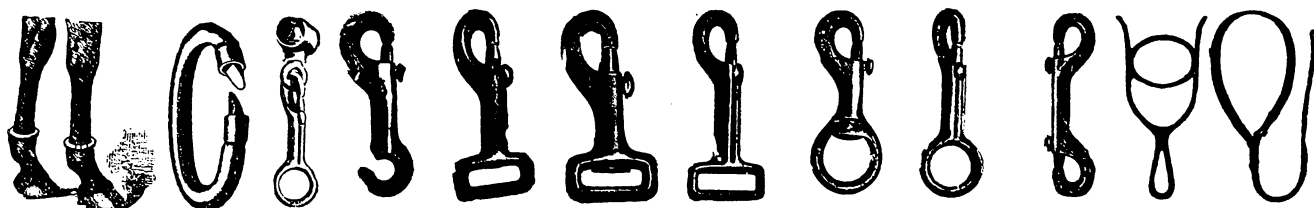
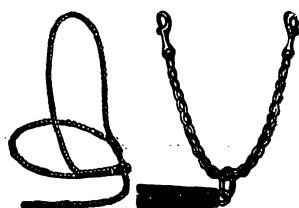
COVERT'S "YANKEE" LOOP SNAP.



Unequaled
in quality,
Cheapest in
price.



COVERT'S
Horse and Mule Jewelry.

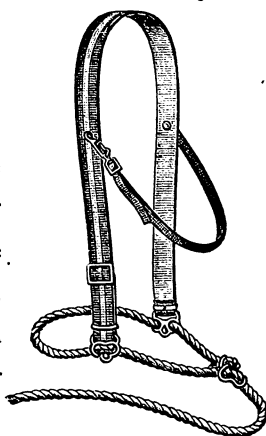


Covert's Combination Adjustable Halter.



This halter is the best and cheapest first-class adjustable halter ever placed upon the market. It is made of superior 13-cord halter web and 7-16 jute rope, and is perfectly adjustable.

Its utility is greatly increased by attaching a bit to the halter



with our No. 510 Double Snap thus making it a safe, convenient and economical Open Bridle.

It is made in two sizes, No. 81 being for medium or ordinary sized horses, and No. 83 for the largest horse.



COVERT'S CELEBRATED HARNESS SNAPS, CHAIN GOODS, ROPE AND WEB GOODS ARE SOLD BY ALL LEADING JOBBERS AT MANUFACTURERS' PRICES.

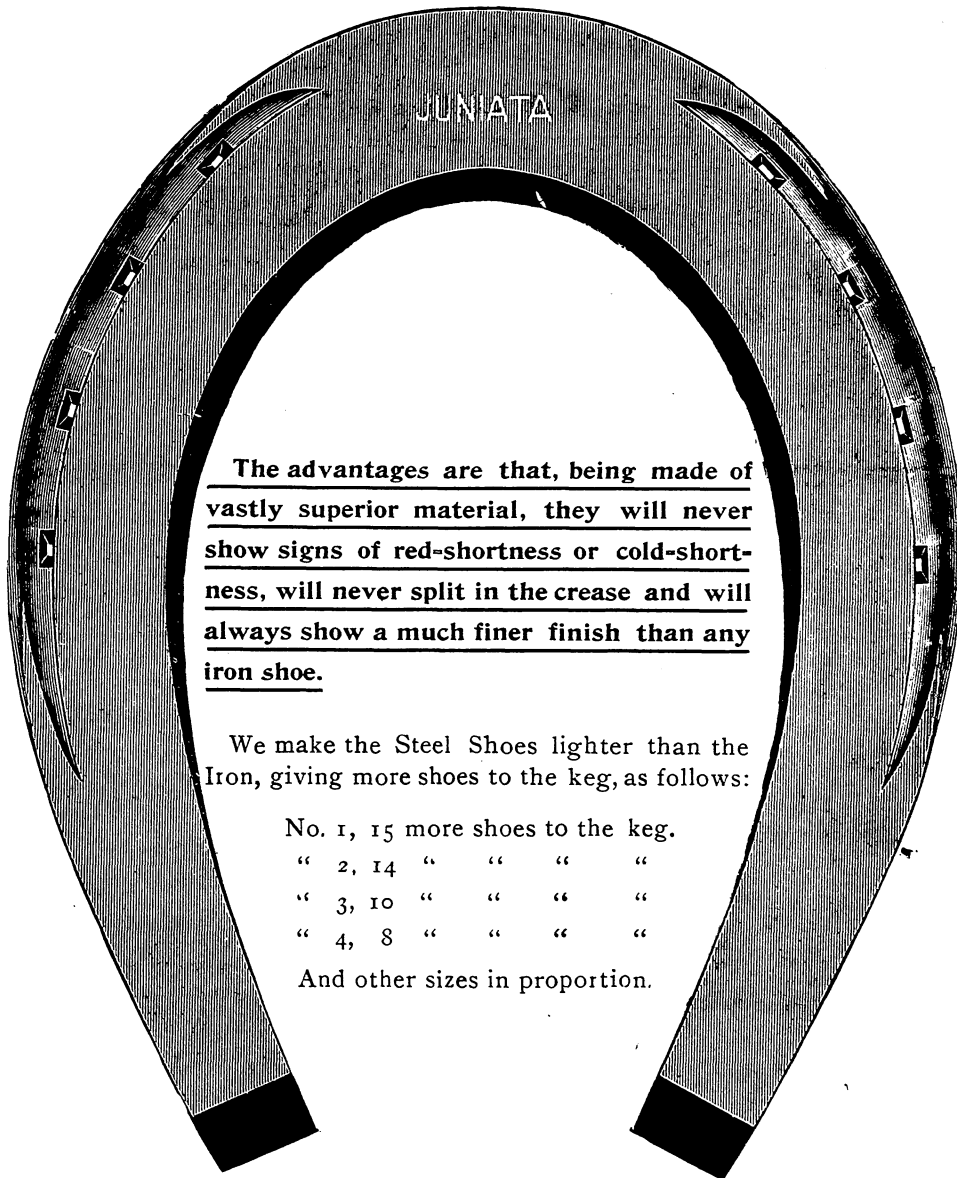
COVERT MFG. CO.,

WEST TROY, N. Y.

STEEL HORSE SHOES.

SHOENBERGER & CO., PITTSBURGH, PA.,

After numerous and costly experiments have succeeded in manufacturing a special quality of soft homogeneous steel, specially adapted to the manufacture of Horse and Mule Shoes, and are now making from this steel Extra Swaged, and Government Pattern Horse and Mule Shoes. They give the best of satisfaction everywhere and we furnish them to the trade at the same prices as the regular iron shoe sold by ourselves and our competitors. We are at present making our Roadster Pattern Horse Shoes out of Iron, but we will make them of Steel also within a short time.



The advantages are that, being made of vastly superior material, they will never show signs of red-shortness or cold-shortness, will never split in the crease and will always show a much finer finish than any iron shoe.

We make the Steel Shoes lighter than the Iron, giving more shoes to the keg, as follows:

No. 1, 15 more shoes to the keg.

" 2, 14 " " " "

" 3, 10 " " " "

" 4, 8 " " " "

And other sizes in proportion.

No. 2 EXTRA SWAGED FRONT.

We also beg to say that we have introduced improved machinery into our new factory and have doubled our capacity, and are now prepared to furnish the best shoe, either iron or steel, ever offered to the trade.

We would also call your attention to our Improved Steel Toe Calk, equal to any in the market. To secure the best wearing qualities use sand or borax in welding on a calk and cool off at a dark red, or still better, cool off without plunging in water. We make sizes numbers 1, 2, 3, 4, 5 and 6, packed in 25 pound boxes.

Write to us for information and prices, or apply to jobbers and dealers, who sell them everywhere.

SHOENBERGER & CO.,

JUNIATA IRON AND STEEL WORKS, - - - PITTSBURGH, PA.

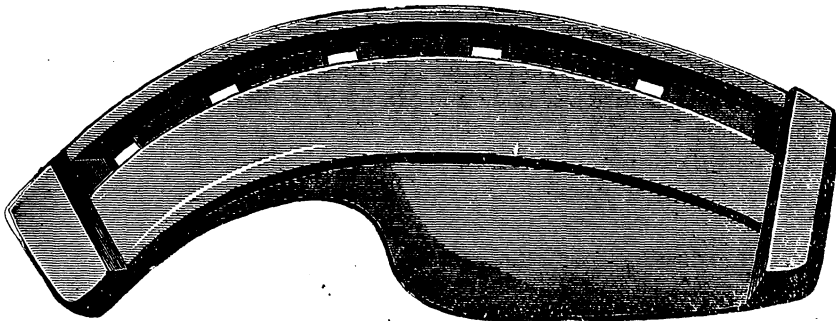
SCRANTON FORGING CO.,

SCRANTON, PA

CARRIAGE HARDWARE ^{AND}

SPECIAL DROP FORGINGS.

FORGED
OX
SHOES.



Made under Deebie's Patent, Aug. 9, 1887.

Our 1891 pattern is a modification of the style we have made for the past four years, giving additional strength to the web.

IT IS JUST RIGHT.

BURDEN'S HORSE SHOES.

"Burden Best"

Iron
Boiler Rivets.

The Burden Iron Co.

TROY, N. Y.

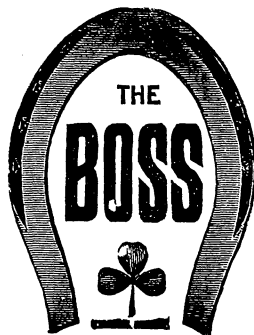
PHOENIX HORSE SHOES.

PHOENIX HORSE SHOE CO.,
Poughkeepsie, N. Y.

NEW YORK OFFICE, No. 66 Reade St.

Standard Horse Shoe Co.,
Manufacturers of
HORSE AND MULE SHOES.

LEEDS, ROBINSON & CO., General Agents,
4 Liberty Square, Boston, Mass.



HORSE AND MULE SHOES.

Superior Quality, Shape and Finish.

BRYDEN HORSE SHOE CO.,
CATASAUQUA, PA.

RHODE ISLAND PERKINS HORSE SHOE CO.,
MANUFACTURERS OF

Horse and Mule Shoes of the Perkins Pattern.

SPECIALTIES:—X L Steel Shoes, Toe Weight Shoes and Goodenough Shoes.
Works at Valley Falls, R. I. Office, 31 Exchange Place, Providence, R. I.
F. W. CARPENTER, Pres., C. H. PERKINS, Gen. Manager, R. W. COMSTOCK, Sec'y,
CHARLES R. STARK, Treas.

J. C. McCARTY & CO., Agents - 97 Chambers Street, New York.

THE NEW DIAMOND STATE HORSE AND MULE SHOES.

JUST TRY THEM and YOU will say they excel all others.

MANUFACTURED BY

DIAMOND STATE IRON CO. WILMINGTON, DELAWARE.

Other "high grade" specialties in Rivets, Spikes, Splice Bars, Track and Machine Bolts, Blank Nuts, Stay Bolt Iron, Horse Shoe Iron, Bar Iron, &c.

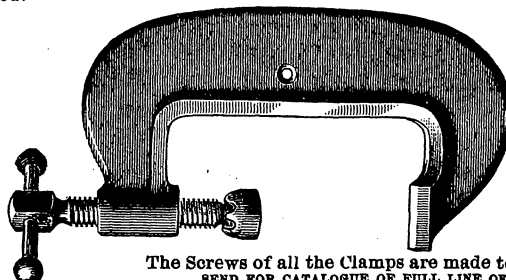
PHILADELPHIA OFFICE,
208 So. Fourth St.

{Correspondence invited}

NEW YORK OFFICE
11 Pine St.

LE COUNT'S HEAVY STEEL CLAMP.

Extra heavy, with Button on end of screw, hung on a ball so as to accommodate itself to irregularities with out bending the screw. The foot of the Clamp is planed.



No. 1, opening to 2 inch.....	\$1 75
" 2, " 3 ".....	2 00
" 3, " 4 ".....	2 25
" 4, " 5 ".....	2 50
" 5, " 6 ".....	2 75
" 6, " 8 ".....	3 25
" 7, " 10 ".....	3 75
" 8, " 12 ".....	4 25
" 9, " 14 ".....	5 00
" 10, " 16 ".....	6 00
" 11, " 18 ".....	7 00
Full Set, 11 sizes, \$40.50.	

Ship or Bridge Clamp with Large Screws.
No. 12 opens 24 inches..... price, \$12 00
13 " 30 "..... 16 00

The Screws of all the Clamps are made to reach the lower number.

SEND FOR CATALOGUE OF FULL LINE OF MACHINISTS' TOOLS.

C. W. LE COUNT, MANUFACTURER, SO. NORWALK, CONN., U. S. A.

These goods are for sale by CHAS. CHURCHILL & CO., Ltd., 21 Cross St., London, England.

1891

H. D. SMITH & CO.,

Plantsville, Conn.,

MANUFACTURERS OF THE BEST QUALITY

CARRIAGE MAKERS' HARDWARE,

MANUFACTURE THE LARGEST VARIETY OF

FORGED CARRIAGE IRONS

Of Best Material and Workmanship.

Send for Price and Illustrated List of

CHAMPLAIN

Manufactured by the NATIONAL HORSE NAIL CO.,
VERGENNES, VERMONT.

All Sizes. All Patterns. All Warranted. Sold Everywhere.

J. C. McCARTY & CO., Agents. New York.



Elegant Iron.

Beautiful Shape.

HORSE SHOES,
Light, Medium and Heavy.

MULE SHOES,
Light, Medium and Heavy.

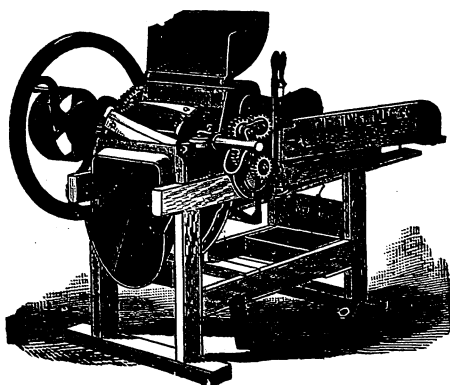
Illustrated booklet and prices to all parts of the world on application.

OLD DOMINION IRON AND NAIL WORKS CO.,

ARTHUR B. CLARKE, President.

Chicago Office, 45 La Salle St.


Richmond, Va., U. S. A.



THE "OHIO" Feed and Ensilage Cutters and Carriers are the best.

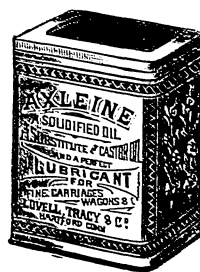
By reason of wide open throat and improved feeding device (being full width of cutting surface, all sizes), our machines have greater capacity than others.

THE SILVER MFG. CO. Salem, O.



P. F. BURKE, C. F. DEWICK & CO.
Successor to
Manufacturer of
PATENT STEEL
(Blunt and Sharp)
TOE-CALKS.
—ALSO—
BURKE'S IMPROVED
HORSESHOERS'
FOOT VICE.
Send for Circulars.
360 Dorchester Av. Die for Welding
BOSTON, MASS. Sharp Calks.

A X LEINE



is a fine quality of Axle Grease put up in square tin boxes containing one pound; beautifully decorated in assorted colors; designed especially for the Hardware Trade. Showy and attractive shelf goods.

Send for sample and prices.

LOVELL, TRACY & CO. 71 Asylum St. Hartford, Conn.

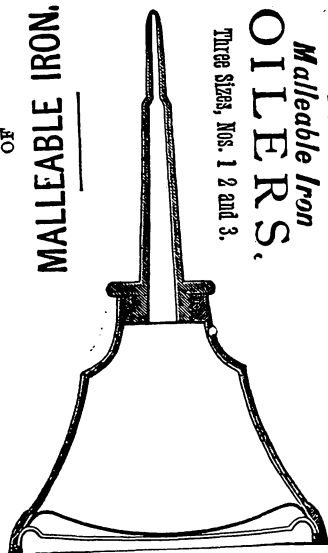
Crescent
Horse and Mule Shoes,
BAR IRON.

CRESCENT HORSE SHOE AND
IRON CO.,
Max Meadows, Va.

BUFFALO SCALE CO., Buffalo, N. Y. SCALES OF ALL KINDS.

Patented Articles
OF

MALLEABLE IRON.



New Improved
PATENT
Malleable Iron
OILERS.
Three Sizes, Nos. 1, 2 and 3.

Hammer's Adjustable Clamps.
Mall. Iron Hand Lamps.
M. I. Hanging Lamps.

New Pattern Heavy Screw Clamps.
Strongest in the market.

For Sale by all the Principal Hardware Dealers.
SEND FOR PRICE LIST.
MALLEABLE IRON CASTINGS
of superior quality, and Hardware Specialties
in Malleable Iron, made to order.

HAMMER & CO., Branford, Conn.

HOWARD IRON WORKS,
BUFFALO, N. Y.

Manufacturers of

BENCH VISES.

Price Lists sent on application.



SASH WEIGHTS

E. E. BROWN & CO.,

McKean and Meadow Sts.,

PHILADELPHIA PA.

THE WILCOX & HOWE COMPANY,
BIRMINGHAM, CONN.,

MANUFACTURERS OF

A Full Line of Carriage Hardware
ALSO SPECIAL FORGINGS.

Estimates cheerfully given. Send for Catalogue

This Wrench can be furnished with Short Nut.

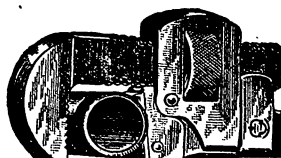


COMBINATION WRENCH.

Case-Hardened Throughout. Parts Interchangeable.

This wrench not only combines the superior qualities of a Gas Pipe Wrench but also all the requisite combinations of a regular Nut Wrench, thus making a combination which has no equal. For Circulars and Price-List, address

BEMIS & CALL HARDWARE & TOOL CO., Springfield, Mass., U. S. A.



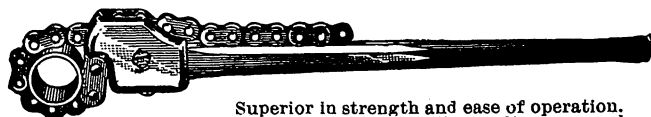
TRIMO PIPE WRENCH,

Forged Steel

All parts interchangeable.

Grips firmly without loss of motion. Releases readily. Never locks. Causes no trouble in close quarters. Does not crush the pipe.

TRIMO
CHAIN
PIPE
WRENCH.



Superior in strength and ease of operation.
COMPLETE circular grip. Never slips nor crushes.

Can be used with one hand and in closer quarters than any other Basin Wrench. Parts Interchangeable.



TRIMO
BASIN WRENCH.

TRIMONT MFG. CO., ROXBURY MASS.

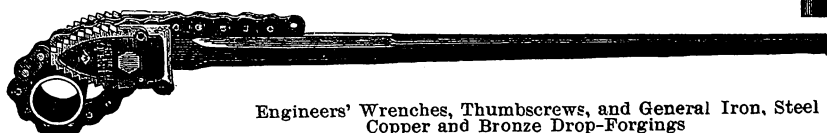
J. H. WILLIAMS & CO.,

9 to 15 Richards Street, Brooklyn, N. Y.

FORGED
Steel Lathe Dogs
In Twelve Sizes.

FORGED
STEEL MACHINE HANDLES
In Six Sizes.

Brock's Patent Drop-Forged Chain Pipe Wrench,
Improved Model, in Seven Sizes.



Engineers' Wrenches, Thumbscrews, and General Iron, Steel
Copper and Bronze Drop-Forgings

Billings' Patent Cutting-Off Tool.



The Holder is drop-forged, of steel, and finished in a thorough manner. The Cutters are made of the best tool steel and furnished in the following thicknesses: $\frac{1}{16}$, $\frac{3}{32}$, $\frac{1}{8}$, $\frac{5}{32}$, $\frac{3}{16}$, $\frac{1}{2}$, $\frac{3}{4}$.

THE BILLINGS & SPENCER CO.,

HARTFORD, CONN., U. S. A.

London House: Chas. Churchill & Co., 21 Cross St., Finsbury.

BOOKS. YOU CAN OBTAIN PROMPTLY the latest work on any subject in which you are interested by addressing DAVID WILLIAMS, Publisher and Bookseller, 96-102 Reade Street, New York.

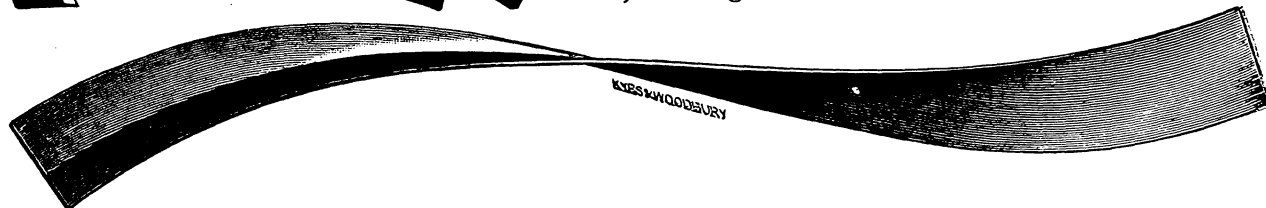
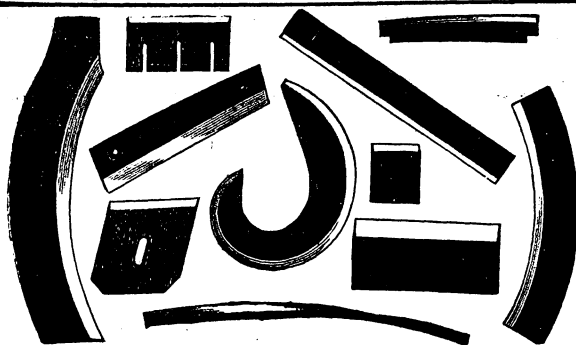
LORING COES & CO.

WORCESTER, MASS.

Manufacturers of **MACHINE KNIVES.**

Shear Blades and Strips, Moulding Cutter Plate, Die Stock for Leather, Cloth and Paper Cutting Dies. Lawn Mower and Hay Cutter Knives of every description.

End view of Plated Stock for Dies, Lawn Mower Knives, Blades Etc., showing how the Steel is laid.

**THE IMPROVED ACME STEEL WRENCH**

PATENTED.

CAPITOL MFG. CO.,

Cable Address: "CAPITOL, CHICAGO."

125 to 137 REES STREET, CHICAGO, ILL., U. S. A.

Awarded Prize Medal at Paris Exposition and Jamaica Exposition



HERCULES. Bright Finish.



HERCULES. Combination Pipe Nut and Nut Wrench. Bright Finish.



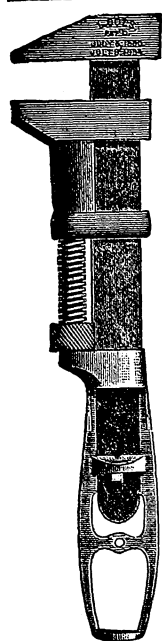
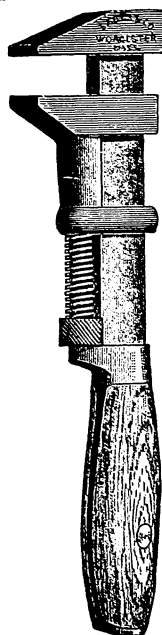
The Hercules Screw Driver and Tack Claw (Patented).

This Screw Driver is made from one piece of special cast steel, in all sizes, from 1 1/4 in. to 12 in. The blade is well polished, carefully tempered, and every screw driver is subjected to a severe test and warranted. Handles Japanned with the best quality baking Japan.

The Strongest and Most Durable Wrench and Screw Driver Made.

Write for Prices and Full Information.

HARMON & DIXON, 118 Chambers St., New York, N. Y., Eastern and Export Agents

**L. COES'**Genuine Improved
**KNIFE HANDLE
PATENT****Screw
Wrenches**MANUFACTURED BY
**COES WRENCH CO.,
WORCESTER, MASS.**Established in
1839.Registered
March 31, 1874.Patented July
6, 1880.Patented July
8, 1884.

Sectional View Illustrates our New Knife Handle, showing Malleable Iron Frame and Shank of Bar keyed into position.

Straight Bar, Extra Long Nut for Screw in Jaw.

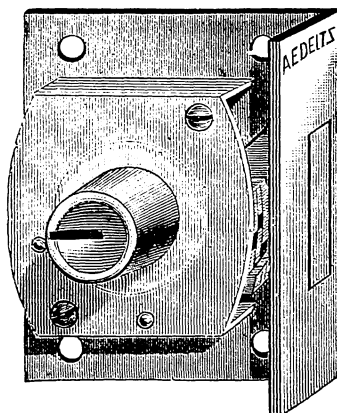
The **BEST MADE** and **STRONGEST WRENCH** in the MARKET
J. C. McCARTY & CO., } New York Agents.
JOHN H. GRAHAM & CO., }

IMPROVED MINE LAMP.

FOR ANTHRACITE AND BITUMINOUS MINING

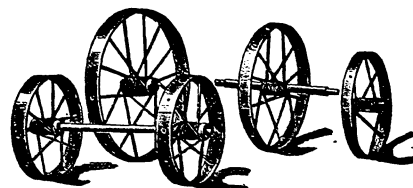
6 DIFFERENT STYLES OF SPOUTS.
SAMPLE 15¢.
SEAMLESS BRASS COLLAR
BRASS HINGE
Lid Solid
No SOLDERING

B. E. LEONARD, Scranton, Pa.

A. E. DEITZ

No. 51 Lock.

J. C. McCARTY & CO., Agents,
97 Chambers and 81 Reade Sts., New York.

Factory, **BROOKLYN, E. D., N. Y.****WHEELS. WHEELS. WHEELS.**

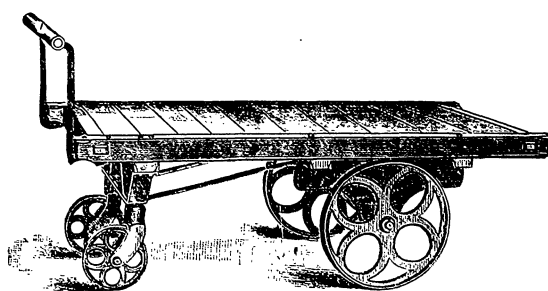
The best there is made for Wheelbarrows and Trucks. Send for Circular and Prices.

Address

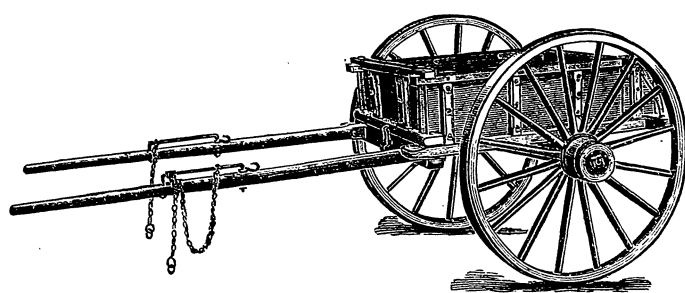
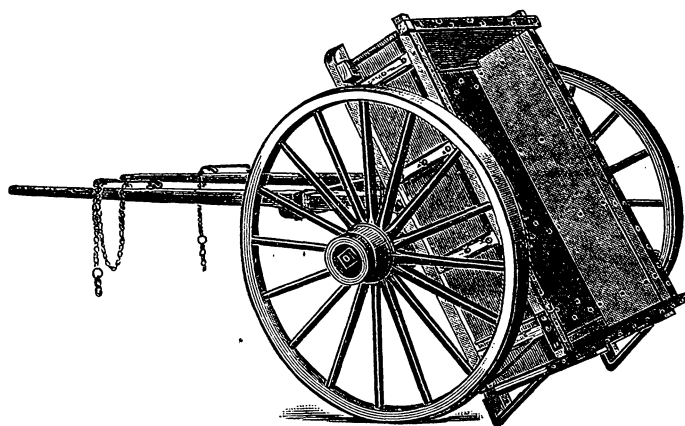
THE Arnold Metal Wheel Co.

Mention The Iron Age. New London, Ohio.

WAREHOUSE TRUCKS AND DUMP CARTS.



THE REYNOLDS IMPROVED WAREHOUSE TRUCKS.

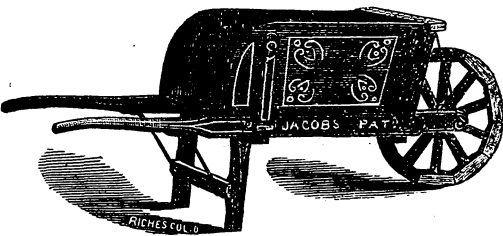
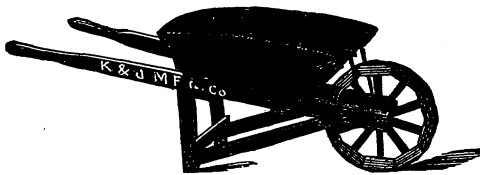
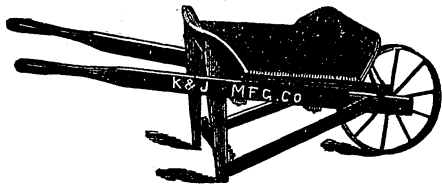


CONTRACTORS' DUMP CART.

WRITE FOR DIMENSIONS AND PRICES OF CARTS, BARROWS AND TRUCKS.

LANSING WHEELBARROW CO.,

LANSING, MICH.



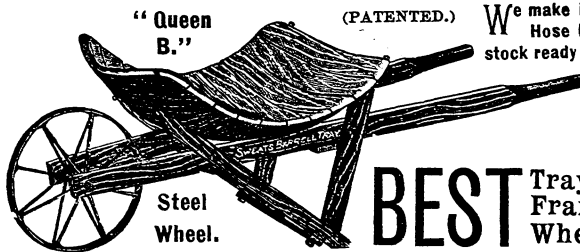
Timely Advice

To dealers about to purchase; do not make the common error of buying goods because they are cheap only; see that they are **both, good and cheap**. A rare combination, but one the discriminating buyer can always secure when purchasing Wheelbarrows, Scrapers, etc., from us.



The Kilbourne & Jacobs Mfg. Co.,
COLUMBUS, OHIO, U. S. A.

"BARREL TRAY"
WHEEL BARROWS
ARE THE BEST ON THE EARTH.



(PATENTED.)

We make Barrows of every description, Factory Trucks, Hose Reels, Mortar and Brick Hods, and carry large stock ready for shipping.

Get our prices and we will get your order.

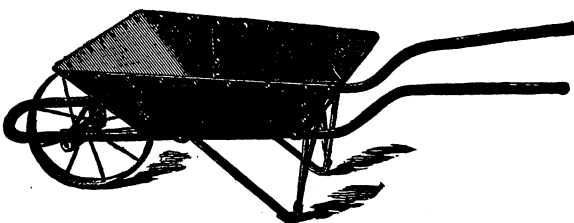
SWEATT MFG. CO.,
Minneapolis, Minn.

J. C. McCARTY & CO., New York, Direct Representatives.

G. A. SEAVER, New Orleans, Special Agent.

BEST Tray Frame Wheel.

Akron Tubular Steel Wheelbarrows.

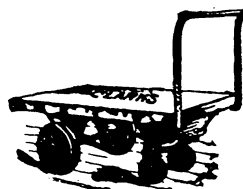


Re-enforced Tray, Strong and Durable.

Also McNeil's Patent Balanced Charging Barrows, Automatic Dump.

Write us for Prices.

THE AKRON TOOL CO., AKRON, O.



TRUCKS of all kinds mounted on rubber or iron wheels. Trucks made to order. Write for prices. Catalogues free.

G. P. CLARK, Box 0, Windsor Locks, Co. 22.

BEFORE

Placing your order for next season's supply of

GRASS HOOKS, Marks Patent, CORN KNIVES, HAY KNIVES, Etc.

Drop us a line. You will hear from us promptly in an agreeable way. Goods are conceded to be the finest in finish and quality ever offered the trade.

Bruce & Marks Manufacturing Co., GAS CITY, INDIANA.

ALL STEEL WHEELBARROWS & SCRAPERS

MANUFACTURED BY

AMERICAN STEEL SCRAPER CO.,

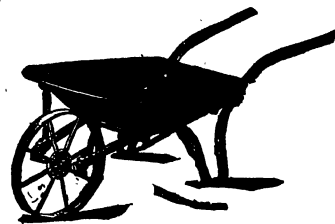
1104 Court Street, SIDNEY, O.



Write for Catalogue

Speaking of Barrows

How do you know that what you're buying is the best the market affords if you don't look into the claims of various Mfrs. and make comparison? **WE** invite comparison both as to quality and price.



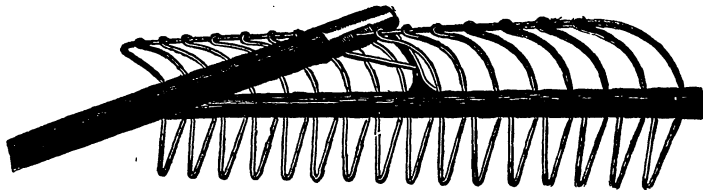
SIDNEY STEEL SCRAPER CO.,

924 Poplar St., Sidney, Ohio.

LAWN RAKES. The "GEM" AND "DAVIS."

Both good and each the best. If you have not stocked up, better do so at once. Our prices are low.

SCHAEFFER & CO., Dayton, O.

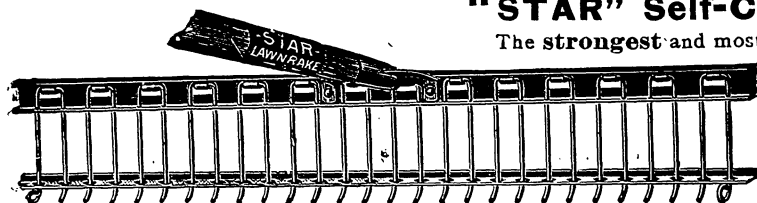


"STAR" Self-Cleaning Lawn Rakes. All Steel.

The strongest and most practical rakes in the market. The cleaning bar keeps the teeth free from leaves and grass and the eyes on the end teeth prevent the other teeth from digging in the ground. We also make "STAR" Lawn Rakes as above without the self-cleaning bars and turned up end teeth.

SYRACUSE SPECIALTY MFG. CO., Syracuse, N. Y., U. S. A.

SURPLESS, DUNN & ALDER, 97 Chambers St., New York, DIRECT REPRESENTATIVES.



"STAR" Self-Cleaning Lawn Rake.
Pat. Feb. 21, 1893.

The "Perfect" Lawn Rake



Write for our prices before buying your stock of Lawn Rakes, Post Hole Diggers, Saw Sets, Can Openers, Steel Spring Curry Combs, Etc.

F. E. Kohler & Co.,
CANTON, O.

HAY KNIVES

SEASON OF 1892-93.

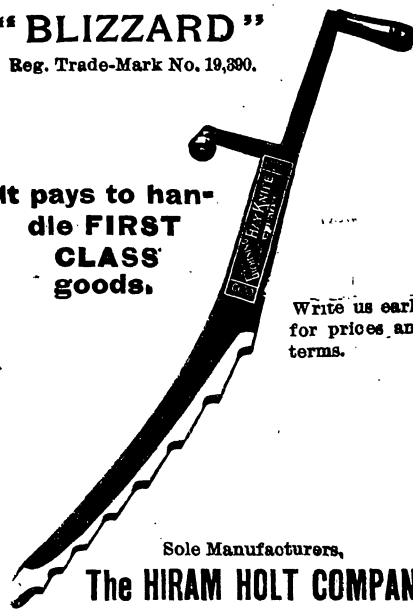
"LIGHTNING"

(Reg. Trade-Mark No. 9583.)

"BLIZZARD"

Reg. Trade-Mark No. 19,390.

It pays to handle **FIRST CLASS** goods.



Write us early for prices and terms.

Sole Manufacturers,

The HIRAM HOLT COMPANY
EAST WILTON, MAINE.

P. J. Conroy & Co.,

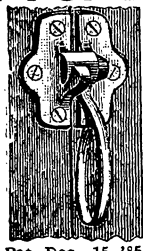
Paschall, PHILADELPHIA.

"CONROY"

Refrigerator Door
Fasteners

Have rapidly supplanted all others.

Refrigerator Trimmings.



Pat. Dec. 15, '85

CYCLONE CORN SHELLER.

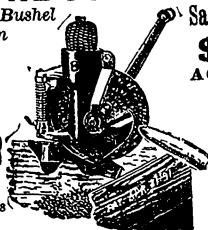
Will Shell a Bushel of Corn

in 4 Minutes.

BEST SHELLER
in the world.

All Machines Warranted.

GARRY IRON ROOFING CO., Sole Manufacturers and Owners, Cleveland O., U.S.A. Mention Iron Age.



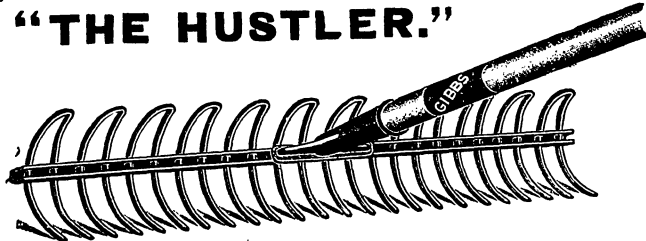
Sample Sheller

\$3.00.

AGENTS WANTED.

Ask your Merchant for it
Send for circular.

"THE HUSTLER."



JNO. H. GRAHAM & CO, General Agents.
113 CHAMBERS ST., NEW YORK.

These **LAWN RAKES** are self-cleaning and have the correct formed teeth to run smoothly and rake clean without digging up the sod.

ALL STEEL-TINNED.

For a light, strong, neat and cheap rake, "THE HUSTLER" is the one to buy.

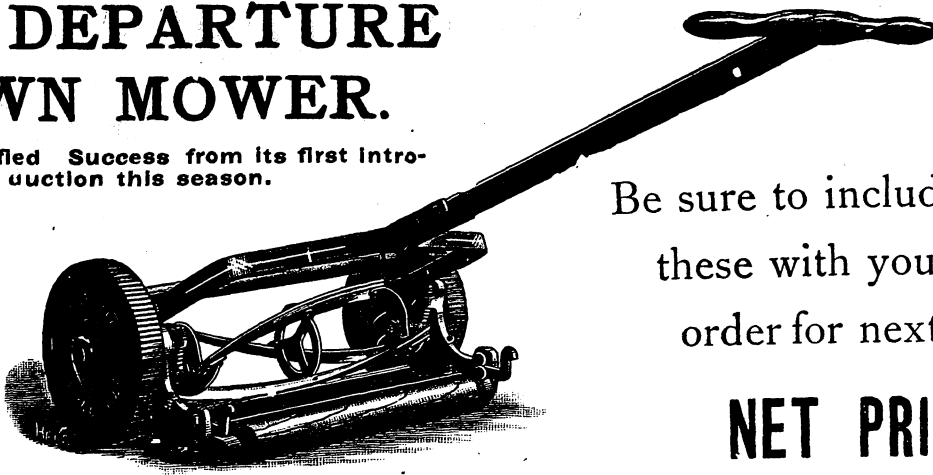
It's our **LATEST** and **BEST** design.

— WE MAKE SIX OTHER STYLES. —

GIBBS MFG. CO., CANTON, OHIO.

NEW DEPARTURE LAWN MOWER.

An Unqualified Success from its first introduction this season.



Be sure to include a line of these with your Mower order for next season.

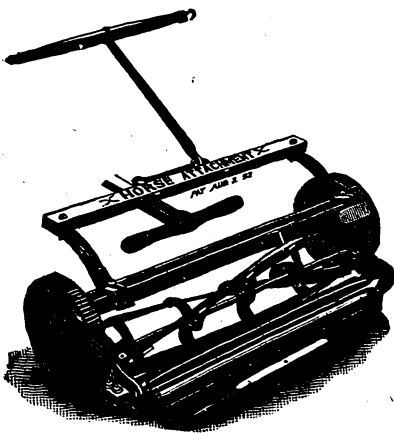
NET PRICES.

Also the celebrated and always popular line of Mowers: *PENNSYLVANIA, CONTINENTAL, GREAT AMERICAN, NEW QUAKER CITY.*

SUPPLEE HARDWARE CO., - PHILADELPHIA.

THE "CHIEF" MOWER

With Horse Attachment.



TEN INCH TRACTION WHEEL. EXCELS FOR FINE QUALITY OF MATERIAL AND FINISH. SIMPLE ADJUSTMENTS, SMOOTH CUTTING.
THE ONLY FIRST-CLASS COMBINATION MOWER ON THE MARKET. PRICES LOW, TERMS REASONABLE.

Mfd. by **CHAMPION MFG. CO.,**

LAWN MOWERS,
RAKES, Etc.,

257 Ft. Wayne Ave., Richmond, Ind.

THE F. & N. MFG. CO.,

Manufacturers of

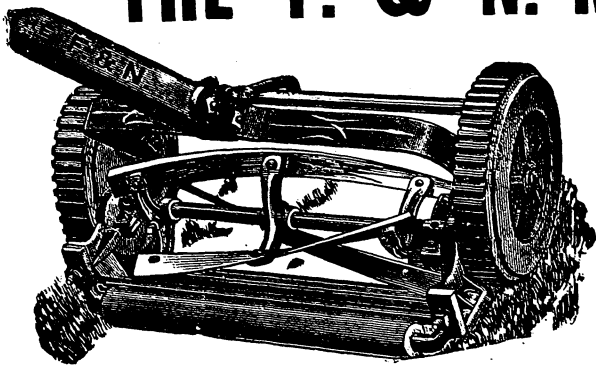
Lawn Mowers, Lawn
Sweepers
and Grass Catchers,

RICHMOND, IND., U.S.A.

The F. & N. High Grade Lawn
Mower. Fully Guaranteed.

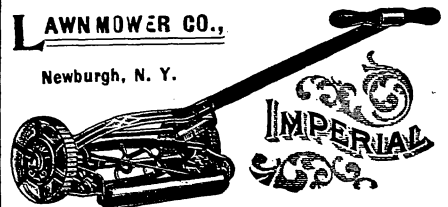
AGENTS

Woodrough & Hanchett Co.,
Chicago, Ill.
C. F. Guyon Co., Ltd., New York.
Woodrough, Mansfield & Co.,
Boston, Mass.



COLDWELL LAWN MOWER CO.,

Newburgh, N. Y.



THE BEST MOWER

ON THE MARKET.

SEND FOR OUR PAPER

"THE LAWN,"

IT IS FULL OF INFORMATION ABOUT LAWNS AND
LAWN MOWERS.

HENLEY'S LAWN MOWERS

First-class high grade machines made of the best materials. Neat, symmetrical, strong, durable and unexcelled in construction and ease of operation. Does perfect work. For prices address

M. C. HENLEY, Sole Mfr., Richmond, Ind., U.S.A.

CARPENTER & BAYLES, Eastern Agents, 91 Chambers St., and 73 Reade St., New York City.



Boss Sprinkler.

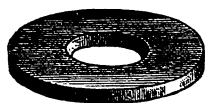
For Potatoes, Tobacco, Cotton and all small Plants and Vines.

Has given satisfaction to all who have handled it.

Prices and Circulars sent on application.

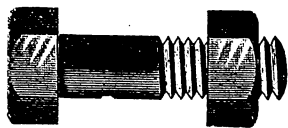
OLIVER A. SMITH,
CLARKSTON, MICH.





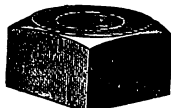
WROUGHT WASHERS

Every Washer
FLAT
With hole in
TRUE CENTER.



Packed in kegs for general trade, or in 1 and 5 lb. boxes for hardware trade.

MACHINE BOLTS.



HOT PRESSED NUTS.

Highest
Standard of
EXCELLENCE.

It will pay you to correspond with us.

MILTON MANUFACTURING CO.,

MILTON, PA.

DIAMOND LAWN MOWER.

OFFICIAL

World's Columbian Exposition
Mower.

1892 and 1893.

105 MOWERS,

FIRST

PREMIUM.

PRACTICAL

SERVICE.

UNIVERSAL

SATISFACTION.

—ADDRESS—

DILLE & MCGUIRE MFG. CO.,

RICHMOND, IND.. U. S. A.

F. L. OLMSTED & CO.
LANDSCAPE ARCHITECTS.

OFFICE OF
D. H. BURNHAM, CHIEF OF CONSTRUCTION.
WORLD'S COLUMBIAN EXPOSITION.

Dille & McGuire Mfg. Co.

JACKSON PARK.

Richmond, Ind.

CHICAGO.

Gentlemen:—

August 24th, 1893.

Your McGuire Diamond Lawn Mowing Machines have been in practical use on the World's Columbian Exposition Grounds since the lawns were first made. It affords me great pleasure to give these machines the best testimonial, in every respect, as regards simple construction, easy care, light working, clean cut and durability. About fifty of our men have operated the Dille & McGuire Mower and they join me in its utmost praise, and I can cheerfully recommend it to the public as one of the best lawn mowers made to-day.

Yours Respectfully,

R. Birch

Sup't Landscape and Miscellaneous
Departments, Jackson Park.

Chadborn & Coldwell Mfg. Co.,

NEWBURGH, N. Y.,

Sole Manufacturers of—



New Model
AND
Excelsior
LAWN
MOWERS
ALSO
The Rival,
The O K,
Etc., Etc.

Send for Illustrated Catalogue.

The New Britain Hardware Mfg. Co.

New Britain, Conn., U. S. A.

MAKERS OF ALL KINDS OF—

Special Machine Screws, Studs, Bolts, &c.

BICYCLE PARTS,
SPECIAL HARDWARE.

Pattern Makers' Dowels and Emery Wheel Dressers.
Electro, Brass and Nickel Plating.

CALF WEANER "Shaw's Pat."

MADE BY

(a) (c) Muzzle Co.

CARROLL, IA.

No wounds.

No fretting.

Put Weaners on Calves and turn them out with the cows.
"It is the only machine I ever had that worked perfectly in every way."
A. R. ANDERSON, County Supervisor.

The Cockburn Barrow and Machine Co.

OFFICE AND WORKS:

234 to 240 Eleventh St., JERSEY CITY, N. J.

NEW CONCRETE MIXING MACHINES.

Coal and Ash Buckets, Coaling Tubs, Coal and Coke Cars, Patent Tubular Frame Wheelbarrows, Furnace Charging Barrows and Cars, Sheet Iron Work of every description, Patent Power Punching Machines, Every Description of General Forgings, Dimpfel Blow Machine Work

A REVOLUTION

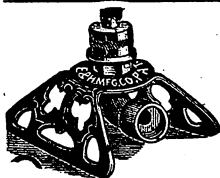
In Lawn Mower Construction.

Frame of single piece of wrought steel. No breakable cast iron bed plate. Bed knife riveted to frame. Adjustment in wiper. All parts steel and malleable iron except drive wheels and pinions.

HIGH WHEEL. HIGH GRADE. LOW PRICE. Fully Guaranteed.

MANUFACTURED BY

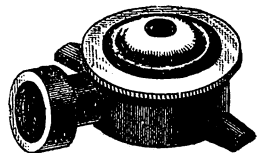
W. E. LAPE, Syracuse, N. Y.



Japanese No. 12,
Adjust.

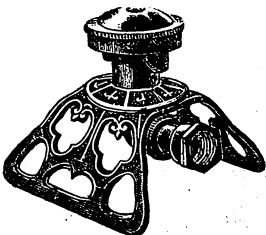
LAWN SPRINKLERS.

Cactus No. 9.



We manufacture the BEST and
CHEAPEST Lawn Sprinklers in
the World.

The only Sprinklers which have no revolving parts to leak or wear out.
The only Sprinklers free from small holes, and which cannot become clogged with gritty substances.
The only Sprinklers which are adjustable and will give a spray as fine as the mist of Niagara, or as heavy as the area of the supply pipe.
The best Sprinklers for high pressures, and the only sprinklers which will give satisfaction with low pressures.
We also manufacture the old style revolving sprinklers, but for our own use would not have them as a gift.

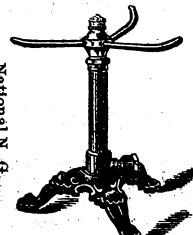


Cactus No. 5.

Ette & Henger Mfg. Co.

ST. LOUIS, MO.

SEND FOR DESCRIPTIVE CIRCULARS.



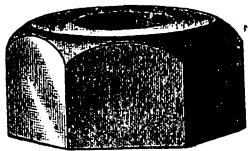
National N. G.

Port Chester Bolt & Nut Co.,

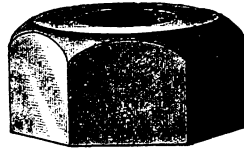
PORT CHESTER, N. Y.

MANUFACTURERS OF

Cold Punched, Chamfered and Trimmed, Case-Hardened
and Semi-Finished



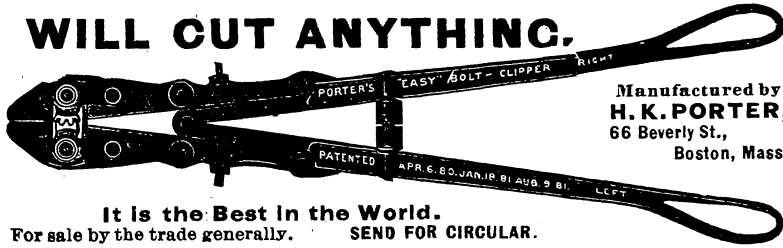
NUTS.



NUTS FOR RAILROADS, CAR BUILDERS', LOCOMOTIVE BUILDERS' AND MACHINISTS'
USE A SPECIALTY.

CORRESPONDENCE SOLICITED.

THE "EASY" BOLT CLIPPER WILL CUT ANYTHING.



It is the Best in the World.
For sale by the trade generally. SEND FOR CIRCULAR.

ESTABLISHED 1865.

J. H. Sternbergh & Son,

READING
PA.

MANUFACTURERS OF
BOLTS, NUTS, WASHERS, RIVETS,

Including Machine Bolts, Carriage Bolts, Bridge Bolts and Car Bolts,
THE HARVEY PATENT GRIP-THREAD TRACK BOLT, Soft Steel Bolts with Cold Rolled
Thread, Bolt Ends, Turnbuckles, Sleeve Nuts, Lag Screws, Set Screws and Tap Bolts and every variety of
screwed work.
BOILER, BRIDGE AND SHIP RIVETS, Square and Hexagon Nuts of all kinds and sizes, Plate
Washers, Belt Lacing Machines, Rods and Irons for Bridges and Buildings, Merchant Bar Iron, etc., etc.
Branch Establishment, **THE KANSAS CITY BOLT & NUT CO.**, Kansas City, Mo.

All Wrought Steel Center Neck Yoke.



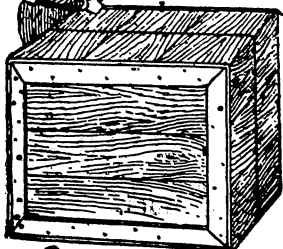
The Strongest, Lightest, Cheapest Yoke on
the Market.

Send for Price-List and Discount.

S. C. JOHNSON, - - Racine, Wis.

Lightning Band for Cases and Crates.

(COVERED BY U. S. LETTERS PATENT.)



Mounted on reels and
always ready for use
and convenient to
handle. Easily and
quickly binds shipping
cases and crates in a
neat, strong and sub-
stantial manner.

PRICES:

No. 1, per reel of 2000
ft., \$4.50 net.

No. 2, per reel of 2000
ft., \$4.75 net.

Pliers for cutting
wire, 50 cents extra.

No. 1 for cases under
800 or 400 pounds, and
No. 2 for all heavier
cases.

Buffalo Specialty Mfg. Co.
Sole Manufacturers,
Buffalo N. Y., U. S. A.

LAG SCREWS



COTTON AND WOOLEN MILLS AND MACHINERY MANUFACTURERS.

AMERICAN-BOLT-CO.
MANUFACTURERS
LOWELL MASS

BOLTS OF ALL KINDS FOR RAILROADS, BRIDGE BUILDERS.



WASHERS OF ALL KINDS.

WM. H. HASKELL, PRESIDENT.

E. S. MASON, TREASURER.

D. A. HUNT, AGENT.

WM. H. HASKELL CO.,

—MANUFACTURERS OF—

GIMLET POINT COACH SCREWS

Bolts, Cold-Punched Nuts and Washers, SUITABLE FOR MACHINERY OF ALL KINDS.

Office and Works: 451 Main St., PAWTUCKET, R. I., U. S. A.

HENRY B. NEWHALL CO., Agents,

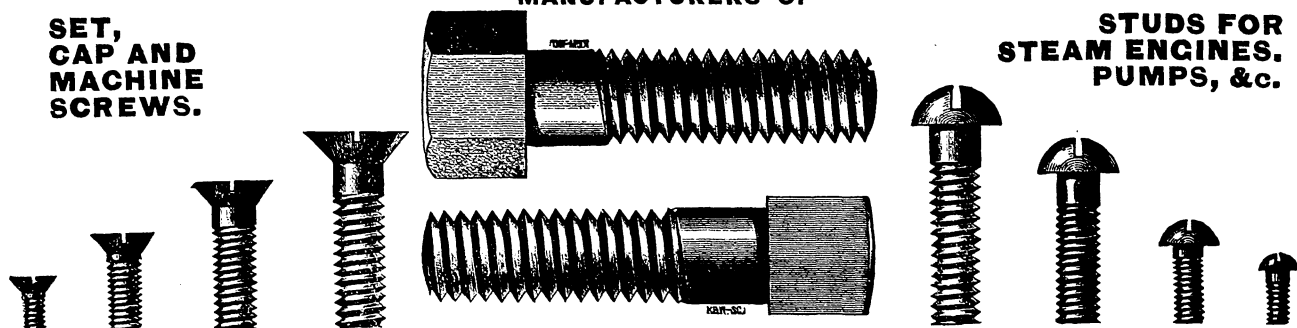
105 CHAMBERS STREET, NEW YORK. - 47 PEARL STREET, BOSTON.

WORCESTER MACHINE SCREW CO., Worcester, Mass.

MANUFACTURERS OF

SET, CAP AND MACHINE SCREWS.

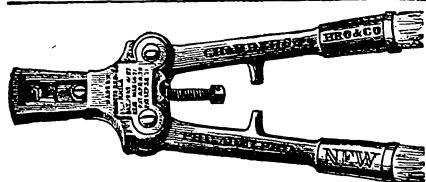
STUDS FOR STEAM ENGINES. PUMPS, &c.



EXPANSION BOLTS.



For Fastening all Kinds of Structure to Brick and Stone Work.
Patentee and M'r, **ISAAC CHURCH,**
Send for Catalogue. Toledo, O.



BOLT & RIVET CLIPPERS,

For cutting off the ends of Bolts and Rivets.
Liberal discounts to the trade.

CHAMBERS BROTHERS COMPANY

52d St., BELOW LANCASTER AVE.,
PHILADELPHIA, PA.

WM. H. JACOBUS,

No. 90 Chambers St., New York.

New York Office of

J. F. Wollensak.
Barnes Mfg. Co.
Penn Lock Works.
Lorenz Bommer.
Palmer Hdw. Mfg Co.
Dibble Mfg. Co.
Wire Goods Co.
Garritt & Beach.
Prindle Mfg. Co.
Tuck Mfg. Co.
Henis Vegetable Press.
Dille & McGuire Mfg. Co.
National Rivet Works.
Lufkin Rule Co.
Wolcott Hdw. Co.
Zimmerman's Blind Adjusters.
Burnside Cedar Faucets.
Fibre Head Mallet.
Glazier's Patent Hcs.

RIVETS

DESCRIPTION FIRST QUALITY

W.P. TOWNSEND & CO.

NEW BRIGHTON, PA.

ROUND HEAD, CONE HEAD, BELT RIVET, WAGON BOX HEAD, COUNTERSUNK, FLAT HEAD, STEEPLE HEAD, TRUSS HEAD, ROSE HEAD.

5lb. 6lb. 7lb. 8lb. 10lb. 12lb.

Metal Punching and Die Work.

Send for prices on Specialties in line of Press Work.

J. FRED WILSON, Worcester, Mass.

Washers for all Purposes.

Cold Punched Nuts and

CLASSIFIED LIST OF ADVERTISERS.

- Air Chambers, Copper.**
Emory, P. P. Mfg. Co., Springfield, Mass.
Springfield Brass Co., Springfield, Mass.
- Air Compressors.**
Norwalk Iron Works, S. Norwalk.
Band Drill Co., 88 Park Place, N. Y.
- Air Moving Machinery.**
Soward & Morse, 45 Fulton, N. Y.
- Aluminum.**
Illinois Pure Aluminum Co. Lemont Ill.
Pittsburgh Reduction Co., Pittsburgh.
Scovill Mfg. Co., Waterbury, Conn.
- Aluminum, Brass and Bronze.**
Gaylord, F. L. Co., Ansonia, Conn.
Haight & Clark, Albany, N. Y.
St. Louis Bronze & Aluminum Works, St. Louis, Mo.
- Analytical Chemists.**
Britton, J. Blodgett Philadelphia, Pa.
Hunt, Robt. W. & Co., Chicago, Ill.
Moore, Dr. Gideon E., 221 Pearl St. N. Y.
- Anti-Friction Metals.—See Babbitt Metal.**
- Anti-Window Rasers.**
Henry, J. T. Mfg. Co. Hamden Conn.
- Anvil and Vise (Combination).**
Fulton Iron & Engine Works, Detroit, Mich.
- Anvils.**
Wright, Peter & Sons, Dudley, Eng.
- Apple Parers.**
Goodell Co., Antrim, N. H.
- Arms and Ammunition.**
Forehand Arms Co., Worcester, Mass.
Harrington & Richardson Arms Co., Worcester, Mass.
Hardley & Graham, 313 & 315 Broadway, New York.
Hulbert Bros. & Co., 28 W. 13d Street, New York.
Read, Wm. & Sons, Boston, Mass.
Stevens, J., Arms and Tool Co. Chicopee Falls, Mass.
Union Metallic Cartridge Co., 313 & 315 Broadway, N. Y.
- Assebloneers.**
Bissell, E. Son & Co., N. Y.
- Angers and Bits.**
Snell Mfg. Co., 72 Reade St., N. Y.
Syracuse Twist Drill Co., Syracuse, N. Y.
- Axes.**
Amer. Axe & Tool Co., 280 E'way, N. Y.
Peck, A. G. & Co., Cohoes, N. Y.
Standard Axe & Tool Co., Ridgway, Pa.
- Axle Grease.**
Lovell, Tracer & Co., Hartford, Conn.
- Axles, Springs, &c.—Manufacturers of.**
Gantier Steel Dept. of Cambria Iron Co., Johnstown, Pa.
Wurster, F. W. & Co., Brooklyn, N. Y.
- Babbitt Metal.**
Bridgeport Deoxidized Bronze & Metal Co., Bridgeport, Conn.
Crown Smelting Co., Chester, Pa.
Elders, T. & Son, St. Louis, Mo.
Keys, W. & R. M. Co., Bridgeport, Conn.
Reeves, Paul S., Philadelphia, Pa.
- Bakers and Roasters.**
Bronson Supply Co., Cleveland, Ohio.
- Bale Ties.**
Kilmer Mfg. Co., Newburg, N. Y.
- Band Saw Machines.**
Cross & Speirs Machine Co., Waterbury, Conn.
- Barb Wire and Fence.**
Consolidated Steel & Wire Co. St. Louis, Mo.
Gantier Steel Dept. of Cambria Iron Co., Johnstown, Pa.
Indiana Wire Fence Co., Crawfordsville, Ind.
Kilmer Mfg. Co., Newburg, N. Y.
Ludlow-Saylor Wire Co., St. Louis, Mo.
Wasburn & Moen Mfg. Co., Worcester.
- Bar Iron, Manufacturers of.**
Alma-Standard Iron & Steel Co., Bridgeport, Conn.
Allentown Rolling Mill, Allentown, Pa.
Burden Iron Co., Troy, N. Y.
Crescent Horse Shoe & Iron Co., Max Meadows, Va.
Montour Iron & Steel Co., Danville, Pa.
Mahoning Valley Iron Co., Youngstown, Ohio.
Sternberg, J. B. & Son, Reading, Pa.
- Bellevue, Manufacturers of.**
Bullock Bellevue Co., Cleveland, O.
Scott, Geo. M., Chicago, Ill.
- Bells.**
Beyn Bros. Mfg. Co., East Hampton.
- Belt Dressing.**
Joe. Dixon Crucible Co., Jersey City, N. J.
- Belt Fasteners.**
Bristol's Mfg. Co., Waterbury, Conn.
Claffen Mfg. Co., Cleveland, Ohio.
Talcott, W. O., Providence, R. I.
- Beltting, Makers of.**
Alexander Bros., 113 N. 8d. Phila.
Jeffrey Mfg. Co., Columbus, O.
Link-Belt Engineering Co., Phila., Pa.
Main Belting Co., Philadelphia, Pa.
N. Y. Belting & Packing Co., Ltd., N. Y.
Roberts Mfg. Co., Pittsburgh, Pa.
Shultz Belting Co., St. Louis, Mo.
- Blowers.**
Buffalo Forge Co., Buffalo, N. Y.
Champion Blower & Forge Co., Lancaster, Pa.
Huyett & Smith Mfg. Co., Detroit, Mich.
Sturtevant, B. E. & Co., Boston, Mass.
- Boiler Plates.**
Carbon Steel Co., Pittsburgh, Pa.
McIlvaine, Wm. & Sons, Reading, Pa.
Lukens Iron & Steel Co., Coatesville, O.
Pottstown Iron Co., Pottstown, Pa.
- Boilers, Copper.**
Randolph & Clowes, Waterbury, Conn.
- Boilers, Steam.**
Sabcock & Wilcox Co., 30 Cortlandt, Edge Moor Iron Co., Wilmington.
Fulton Steam Boiler Works and Fdry., Richmond, Ind.
Harrison Safety Boiler Wks., Phila., Pa.
Phoenix Iron Works Co., Meadville, Pa.
Pollock, W. B. & Co., Youngstown, O.
Southwark Fdy. & Mch. Co., Phila., Pa.
Wetherill, Robt. & Co., Chester, Pa.
- Bolt Cutters.**
Chambers Bros. Co., Philadelphia.
Howard Iron Works, Buffalo, N. Y.
Porter, H. B., Boston, Mass.
Reece, Edw. F., Greenfield, Mass.
Wells Bros. Co., Greenfield, Mass.
Wiley & Russell Mfg. Co., Greenfield, Mass.
- Books.**
Marine Review, Cleveland, Ohio.
Williams, David, 96-102 Reade, N. Y.
Wolcott & West, Syracuse, N. Y.
- Boring Machines.**
Buckeye Mfg. Co., Union City, Ind.
- Boxes, Hdw. Shelf, &c.**
Green, A. H., 22 Park Place, N. Y.
Jones, Jesse & Co., Philadelphia, Pa.
- Box Strap.**
Cary Mfg. Co., 5-9 Elm St., N. Y.
- Box Straps and Corners.**
Buffalo Specialty Mfg. Co., Buffalo, N. Y.
- Brackets.**
Atlas Mfg. Co., New Haven, Conn.
- Brass, Manufacturers of.**
Ansonia Brass & Copper Co., N. Y.
Davol, John & Sons, 100 John, N. Y.
Plume & Atwood Mfg. Co., N. Y.
Randolph & Clowes, Waterbury, Conn.
Scovill Mfg. Co., Waterbury, Conn.
Waterbury Brass Co., 298 B'way, N. Y.
- Brass Butt Hinges.**
Tiebout, W. & J., 16 & 18 Chambers.
- Brass Founders.**
Best, Fox & Co., Pittsburgh, Pa.
Bridgeport Deoxidized Bronze & Metal Co., Bridgeport, Conn.
Cramp, Wm. & Sons, S & E. B. Co., Philadelphia, Pa.
Emory, P. P. Mfg. Co., Springfield, Mass.
Eynon-Evans Mfg. Co., Philadelphia, Pa.
Fram, E. T., Lancaster, Pa.
Haight & Clark, Albany, N. Y.
Keys, W. W. & R. M. Co., Bridgeport, Conn.
North Bros. Mfg. Co., Phila., Pa.
Reeves, Paul S., Philadelphia.
- Brass Goods.**
Brass Goods Mfg. Co., 88 Chambers.
- Bread Knives.**
Christy Knife Co., Fremont, O.
- Bridge Builders.**
Berlin Iron Bridge Co., East Berlin, Ct.
Boston Bridge Works, Boston, Mass.
Wrought Iron Bridge Co., Canton, O.
- Bronze (Tobin).**
Ansonia Brass & Copper Co., 19-26 Cliff Street, N. Y.
- Brooms and Brushes.**
Lay, Jos. & Co., Ridgeville, Ind.
- Builders' Hardware.**
Corbin, P. & F., New Britain, Conn.
Deitz, A. E., 97 Chambers St., N. Y.
Reading Hdw. Co., Reading, Pa.
Yale Towne Mfg. Co., Stamford, Ct.
- Butchers' Steel.**
Challillon, John & Sons, 85-89 Cliff St., N. Y.
Hoffman, C. & A., Philadelphia, Pa.
- Butcher and Shoe Knives, Manufacturers of.**
Challillon, John & Sons, 85-89 Cliff St., N. Y.
Gooden Co., Antrim, N. H.
Wilson, John, Sheffield, England.
- Butts and Hinges.**
McKinney Mfg. Co., Alleghany, Pa.
Sabin Machine Co., Montpelier, Vt.
- Stanley Works, New Britain, Conn.**
Tiebout, W. & J., 16 Chambers, N. Y.
- Calf Weaners.**
Carroll Muzzle Co., Carroll, Ia.
- Can Makers' Tools and Machines.**
Niagara Stamping and Tool Co., Buffalo, N. Y.
- Calipers and Dividers.**
J. Stevens Arms and Tool Co., Chicopee Falls, Mass.
Starrett, L. S., Athol, Mass.
- Car Axles.**
Roberts, A. & P. & Co. Phila.
- Carboy Stands.**
Hillebrand & Wolf, Philadelphia, Pa.
- Car Wheels.**
Whitney, A. & Sons, Phila.
- Carriage Hardware, Makers of.**
Covert's Saddlery Works, Farmer, N. Y.
Barnes, Richard, Auburn, N. Y.
Hartzell, W. O., Greenville, O.
Scranton Forging Co., Scranton, Pa.
Smith, H. D. & Co., Plantsville, Conn.
Wileox & Howe Co., Birmingham, Conn.
- Cartridge Reloading Tools.**
Ideal Mfg. Co., New Haven, Conn.
- Casters, Wheel, &c.**
Clark, G. F., Windsor Locks, Conn.
- Casting, Iron and Steel.**
Ames Sword Co., Chicopee, Mass.
Arcade Malleable Iron Co., Worcester, Mass.
Booth, The Lloyd, Co., Youngstown, O.
Burgess & Loxley, Buffalo, N. Y.
The Burr & Houston Co., Brooklyn, N. Y.
Cambria Steel-Cambria Iron Co., Johnstown, Pa.
Cheney, S. & Son, Manlius, N. Y.
Chester Steel Casting Co., Phila.
Chromes Steel Works, Brooklyn, N. Y.
Dayton Malleable Iron Co., Dayton, O.
Eite & Henger Mfg. Co., St. Louis, Mo.
Eureka Cast Steel Co., Chester, Pa.
Flagg, Stanley G. & Co., Phila.
Garland Foundry Co., Cleveland, O.
Haight & Clark, Albany, N. Y.
Hammer & Co., Branford, Conn.
Herrick, J. A., 294 Pearl St., N. Y.
Johnson, I. G. & Co., Spuyten Duyvil, Mahoning Fdry & Mch. Co., Danville, Pa.
Palmer & De Mooy, Cleveland, O.
Sessions Foundry Co., Bristol, Conn.
Shilling Fdy. Co., Columbus, O.
Snodgrass & Sons, Guilford, Conn.
Standard Fdy. & Mfg. Co., Cleveland, O.
Standard Steel Casting Co., Thurlow, Pa.
Taylor & Boggis Fdry. Co., Cleveland, Ohio.
Taylor Iron & Steel Co. High Bridge, N. J.
Touss & Rogg Iron & Steel Fdry Co., Pittsburgh, Pa.
Union Mfg. Co., 103 Chambers St., N. Y.
Wetherill, Robt. & Co., Chester, Pa.
- Chains.**
Harris & Co., Philadelphia.
Bridgeport Chain Co., Bridgeport, Conn.
Link-Belt Engineering Co., Phila. Pa.
McKay, Jas. & Co., Pittsburgh, Pa.
- Chimneys.**
Phila. Engineering Works, Phila., Pa.
- Chisels, Manufacturers of.**
Buck Bros., Millbury, Mass.
White, L. & I. J. Co., Buffalo, N. Y.
- Chucks.**
Cushman Chuck Co., Hartford, Conn.
Smith & Edge Mfg. Co., Bridgeport.
Union Mfg. Co., 103 Chambers, N. Y.
Whitton, D. E. Mach. Co., New London, Conn.
- Clamps.**
Hammer & Co., Branford, Conn.
Le Count, C. W., So. Norwalk, Conn.
- Clippers.**
Lee, Jesse & Sons, Philadelphia, Pa.
- Clipping Machines.**
Hickley, E. S., Bridgeport, Conn.
McCoy, Jos. F. & Co., 26 Warren St.
- Coal.**
Barns, C. K. & Co., Philadelphia, Pa.
Wister, Francis, Philadelphia, Pa.
- Coffee and Spice Mills.**
Sun Mfg. Co., Greenfield, O.
Waddell Wooden Ware Works, Greenfield, O.
- Coke.**
Barns, C. K. & Co., Philadelphia, Pa.
Houston, C. B. & Co., Philadelphia, Pa.
Rainey, W. J., Cleveland, O.
Sibell, Geo. H. & Co., Chicago, Ill.
Wister, Francis, Philadelphia, Pa.
- Collections.**
Hardware Board of Trade (Limited) 4 and 6 Warren, N. Y.
- Condensers.**
Worthington, Henry R., 86 & 88 Liberty Street, N. Y.
- Conveying Machinery.**
Brown Holsting & Conveying Machine Co., Cleveland, Ohio.
Jaco, C. O., Columbus, O.
Link Belt Engineering Co., Phila., Pa.
- Copper.**
Ames Sword Co., Chicopee, Mass.
Ansonia Brass & Copper Co., 19 and 21 Cliff, N. Y.
Hendricks Bros., 49 Cliff, N. Y.
New Haven Copper Co., 294 Pearl, N. Y.
Randolph & Clowes, Waterbury, Conn.
Wister, Francis, Philadelphia, Pa.
- Coppersmith.**
Emory, P. P. Mfg. Co., Springfield, Mass.
- Cordage.**
Samson Cordage Works, Boston, Mass.
- Cork Screws.**
Williamson, C. T. Wire Novelty Co. Newark, N. J.
- Cornice Brakes.**
Bertsch & Co., Cambridge City, Ind.
Robinson, J. M. & Co., Cincinnati, O.
- Corn Poppers.**
Olsen, A. B., Kansas City, Mo.
- Corn Shellers.**
Garry Iron Rfg. Co., Cleveland, O.
- Corrugated Furnaces.**
Continental Iron Wks, Brooklyn, N. Y.
- Corrugated Iron.**
Cambridge Roofing Co., Cambridge, O.
Moseley Iron Bridge & Roof Co., 6 Dey, N. Y.
- Counting Machines.**
Durant, W. N., Milwaukee, Wis.
Osborn, G. Edw. & Co., New Haven, Ct.
- Coupling.**
Almond, T. R., Brooklyn, N. Y.
- Coverings, Boiler and Pipe.**
Johns, H. W. Mfg. Co., 87 Maiden Lane.
- Cranes.**
Detroit Foundry Equipment Co., Detroit, Mich.
Halsey, W. S. & Co., Birdsboro, Pa.
Harrington, E. Son & Co., Phila., Pa.
Maris & Beekley Philadelphia, Pa.
Ridgway, Craig & Sons, Coatesville, Pa.
Sellers, Wm. & Co., Inc., Phila., Pa.
Yale & Towne Mfg. Co., Stamford Conn.
- Cupolas, Hot-Blast.**
Colliau, Victor, Detroit, Mich.
Detroit Fdry. Equipment Co., Detroit Mich.
- Cutlery Cases.**
Torrey, J. R. & Co., Worcester, Mass.
- Cutlery, Importers of.**
Field, Alfred & Co., 83 Chambers St., New York.
Gurney, Fred B., 116 Chambers St., N. Y.
Sickles, Sweet & Lyon, 35 Barclay, N. Y.
- Cutlery, Manufacturers of.**
Bingham, W. Co., Cleveland, Ohio.
Christy Knife Co., Fremont, O.
Dame, Stoddard & Kendall, Boston Mass.
Electric Cutlery Co., 113 Chambers, N. Y.
Goodell Co., Antrim, N. H.
Nichols Bros., Greenfield, Mass.
Northampton Cutlery Co., Northampton, Mass.
Schmactenberg Bros., 98 Chambers Street, N. Y.
Wilson, John, Sheffield, England
- Dampers.**
Shepard, Sidney & Co., Buffalo, N. Y.
- Dehorner.**
Brown, H. H. Mfg. Co., Decatur, Ill.
- Dies.**
Wilson, J. Fred, Worcester, Mass.
- Dog Collars.**
Chapman Mfg. Co., Meriden, Conn.
Union Hardware Co., Torrington, Ct.
- Door Bells.**
Graham, Jno. H. & Co., 113 Chamber St., N. Y.
- Door Checks and Springs.**
Corbin, P. & F., New Britain Conn.
Russell & Erwin Mfg. Co., New York.
- Door Knobs.**
Bardsley, J., 149 & 151 Baxter St., N. Y.
- Drain Cleaners.**
Buckeye Mfg. Co., Union City, Ind.
- Drawing Instruments.**
Keufel & Esser Co., 127 Fulton St., N. Y.
- Drilling Machines.**
Bickford Drill Co., Cinn., Ohio.
Buffalo Forge Co., Buffalo, N. Y.
Burnham, Geo. Co., Worcester, Mass.
Champion Blower and Forge Co., Lancaster, Pa.
Colburn, A. M., New Haven, Conn.
Dallett, Thos. H. & Co., Philadelphia.
Dwight Slate Machine Co., Hartford Conn.
Halsey, Jas. T., Philadelphia, Pa.
Hamilton Mch. Tool Co., Hamilton, O.
Herrick & Cowell, New Haven, Conn.
Norton & Jones machine Tool Works, Plainville Conn.
Penn. Diamond Drill & Mfg. Co., Birdsboro, Pa.
Quint, A. D., Hartford, Conn.
Sellers, Wm. & Co., Inc., Phila., Pa.
Sibley & Ware, So. Berd, Ind.
Sigourney Tool Co., Hartford, Conn.
Silver Mfg. Co., Salem, O.
Smith Friction Drill & Tool Co., Boston, Mass.
Woodward & Rogers, Hartford, Conn.
- Drop Forgings.**
Barnes, Jas. C., New Haven, Conn.
Billings & Spencer Co., Hartford, Conn.
Boone, W. C. Mfg. Co., Boonton, N. J.
Eccles, Richard, Auburn, N. Y.
Herbrand Co., Fremont, O.
Merrill Bros., Brooklyn, N. Y.
Miner & Peck Mfg. Co., New Haven, Ct.
Phila. Drop Forge Co., Philadelphia, Pa.
Scranton Forging Co., Scranton, Pa.
Spiers, J. C. & Co., Worcester, Mass.
Williams, J. H. & Co., Brooklyn, N. Y.
Wilmot & Hobbs Mfg. Co., Bridgeport, Conn.
Wyman & Gordon, Worcester, Mass.
- Drop Presses.**
Bliss, E. W. Co., Brooklyn, N. Y.
Crosby, G. A. & Co., Chicago, Ill.
Ferracute Mch. Co., Bridgeton, N. J.

See Alphabetical Index, Pages 121 & 122.

- Miner & Peck Mfg. Co.,** New Haven Conn.
Robinson, J. M. & Co., Cincinnati, O.
Stiles & Parker Press Co., Brooklyn, N. Y.
Vulcan Iron Works, Chicago, Ill.
Waterbury Farrel Foundry and Machine Co., Waterbury, Conn.
- Dumb Waiters.**
Storm Mfg. Co., Newark, N. J.
- Dust Beaters.**
Feabody & Parks, Troy, N. Y.
- Dynamite.**
New York Powder Co., 62 Liberty St. N. Y.
- Dynamos.**
O. & C. Electric Co., 402 and 404 Greenwich St., N. Y.
Detroit Dynamo Co., Detroit, Mich.
Lowell Mfg. Co., Ltd., Erie, Pa.
Zucker & Levett Chemical Co., 10 14 Grand St., N. Y.
- Edge Tools. Makers of.**
Amer. Axe & Tool Co., 280 B'way, N. Y.
Buck Bros., Millbury, Mass.
Buffalo Edge Tool Wks., Buffalo, N. Y.
Plumb, Fawcett & Co., Philadelphia, Pa.
Standard Axe & Tool Co., Ridgway, Pa.
White, L. & J. J. Co., Buffalo, N. Y.
- Egg Beaters.**
North Bros. Mfg. Co., Philadelphia.
- Electric Bells and Supplies.**
Ostrander, W. R. & Co., 204 Fulton St., New York
Wollensak, J. F., Chicago, Ill.
- Electric Dynamo Machines.**
Co'bun Electric Mfg. Co., Fitchburg, Mass.
Hanson & Van Winkle Co., Newark, N. J.
- Electro-Platers.**
Boardman, L. & Son, East Sadding Ct.
- Elevators. Makers of.**
Link-Belt Engineering Co., Phila., Pa.
Morse, Williams & Co., Phila., Pa.
Salem F'dry & Mch. Co., Salem, Mass.
Variety Mch. Co., Warsaw, N. Y.
- Emery and Emery Wheels.**
Bell, Geo. E., 36 John St., N. Y.
Grant Corundum Wheel Mfg. Co., Worcester, Mass.
N. Y. Belting & Packing Co., Ltd., N. Y.
Northampton Emery Wheel Co., Leeds, Mass.
Norton Emery Wheel Co., Worcester, Mass.
Sterling Emery Wheel Co., 174 Fulton St., New York.
- Enamels.**
Nubian Iron Enamel Co., Cragin, Ill.
- Engineers and Contractors.**
Alken Henry, Pittsburgh, Pa.
Artificial Gas Engineering Co., Pittsburgh, Pa.
Herrick, J. A., 284 Pearl St., N. Y.
Kennedy, J. M., Pittsburgh, Pa.
Laughlin, Alex. & Co., Pittsburgh, Pa.
Lean, D. R. Co., Pittsburgh, Pa.
McClure, Amster & Co., Pittsburgh, Pa.
Pittsburgh Iron & Steel Engineering Co., Pittsburgh, Pa.
Roberts, Frank C., Philadelphia, Pa.
Smayth, S. R. Co., Incorporated Pittsburgh, Pa.
Swindell, W. & Bros., Pittsburgh, Pa.
Witherow, Jas. F. Co., Pittsburgh, Pa.
- Engines, Gas.**
Otto Gas Engine Works, Phila., Pa.
Rollason Gas Engine, Havemayer Bldg., N. Y.
- Engines, Steam. Makers of.**
Bass Foundry & Machine Works, Ft. Wayne, Ind.
Buckeye Engine Co., Salem, O.
Erie Engine Works, Erie, Pa.
Lane & Bodley Co., Cincinnati, O.
Norwalk Iron Works Co., So. Norwalk, Conn.
Penna. Diamond Drill & Mfg. Co., Birdsboro, Pa.
Phila. Engineering Works, Phila., Pa.
Phoenix Iron Wks. Co., Meadville, Pa.
Shipman Engine Co., Boston, Mass.
Southwark Foundry and Machine Co., Phila., Pa.
Ted, William & Co., Youngstown, O.
Wetherill, Robt. & Co., Chester, Pa.
- Exhaust Tumblers.**
Sweester, W. A., Brooklyn, Mass.
- Expansion Bolts.**
Boone, W. C. Mfg. Co., Boonton, N. J.
Church, Isaac, Toledo, O.
- Faucets, Self-Measuring.**
Lane Bros., Poughkeepsie, N. Y.
- Faucets, Wooden. Makers of.**
Boston & Lockport Block Co., Boston, Mass., and Lockport, N. Y.
John Sommer's Son, Newark, N. J.
- Feed-Water Heaters.**
Davis, I. B. & Son, Hartford, Conn.
Goubert Mfg. Co., 32 Cortlandt St., N. Y.
Harrison Safety Boiler Wks., Phila., Pa.
National Pipe Bending Co., New Haven, Conn.
Webster, Warren & Co., Camden, N. J.
Whitlock Coil Pipe Co., Elmwood, Conn.
- Fencing, Iron and Wire.**
Barnum, E. T., Detroit, Mich.
Champion Iron Co., Kenton, O.
Clinton Wire Cloth Co., Clinton, Mass.
Gilbert & Bennett Mfg. Co., 42 Cliff St., Hartman Mfg. Co., Ellwood City, Pa.
Kilmer Mfg. Co., Newburgh, N. Y.
Mass. Focs & Co., Springfield, O.
The Van Dorn Iron Works Co., Cleveland, O.
Reliance Wire & Iron Wks., Milwaukee, Minn.
- Fiber Ware.**
Standard Fiber Ware Co., Mankato, Minn.
- Files. Importers of.**
Moss, F. W., 80 John, N. Y.
- Files and Rasps. Manufacturers of.**
Arcade File Works, Anderson, Ind.
Bunker & White, Troy, N. Y.
- Barnett, G. & H.,** 41 & 48 Richmond Phila.
McAdams File Co., Philadelphia.
Nicholson File Co., Providence R. I.
- Fire Brick. Makers of.**
Borner, Cyrus, Philadelphia, Pa.
Gardner, Jas. & Son, Cumberland, Md.
Krelscher B & Sons, Foot E. Houston, St.
McLeod & Henry Co., Troy, N. Y.
Maurer, H. & Son, 430 E. 23d, N. Y.
Ostrander Fire Brick Co., Troy, N. Y.
Vaentine, M. D. & Bro., Woodbridge.
- Fire Sets.**
Troy Nickel Works, Troy, N. Y.
- Fishing Tackle.**
Dame, Stoddard & Kendall, Boston, Mass.
- Flint and Emery Paper.**
Baeder, Adamson & Co., Phila., Pa.
- Flour Sifters.**
Meyers, F. J. Mfg. Co., Covington, Ky.
Sills, W. H., 81 Lake St., Chicago, Ill.
- Flower Stands.**
Cincinnati Mfg. Co., Cincinnati, O.
- Flue Cleaners.**
Mackey, Jas. T., St. Louis, Mo.
- Fodder Cutters.**
Silver Mfg. Co., Salem, O.
- Foreign Periodicals.**
Stechert, G. E., 310 Broadway, N. Y.
- Forges, Portable, &c.**
Bullock Bellows Co., Cleveland, O.
Buffalo Forge Co., Buffalo, N. Y.
Champion Blower & Forge Co., Lancaster, Pa.
Empire Portable Forge Co., Lansingburg, N. Y.
Sturtevant, B. F. Co., Boston, Mass.
- Forgings, Iron and Steel.**
Bethlehem Iron Co., Bethlehem, Pa.
Cambria Steel—Cambria Iron Co., Johnstown, Pa.
Scranton Forging Co., Scranton, Pa.
- Foundry Facings.**
Paxson, J. W. & Co., Phila.
S. Obermayer Co., Cincinnati, O.
Smith, J. D. Fdy. Supply Co., Cinn., O.
- Foundry Middles.**
Eatey, W. S., 65 Fulton, N. Y.
- Foundry Supplies.**
Colliau, Victor, Detroit, Mich.
Diamond Clamp & Flask Co., Richmond, Ind.
S. Obermayer Co., Cincinnati, O.
Paxson, J. W. & Co., Philadelphia.
Smith, J. D. Fdy. Supply Co., Cinn., O.
- Friction Clutches.**
Keystone Clutch & Mch. Wks., Phila., Pa.
Moore & White Co., Philadelphia, Pa.
- Friction Cone.**
Evans Friction Cone Co., Boston, Mass.
- Fruit Presses.**
Enterprise Mfg. Co., Philadelphia, Pa.
- Garden Tools.**
Dunlap, C. W., Box 2703, New York
- Gas Producers.**
Wood, R. D. & Co., Philadelphia, Pa.
- Gas & Steam Fitters' Supplies.**
Pancoast, Henry B. & Co., Phila., Pa.
- Gauge, Rolling Mill.**
Haines Gauge Co., Philadelphia, Pa.
- Gear Cutters.**
D. E. Whiton Mach. Co., New London, Conn.
- Gears.**
Boston Gear Works, Boston, Mass.
Gleason Tool Co., Rochester, N. Y.
Fly, Robt. & Son Co., Baltimore, Md.
- Glass Cutters.**
Monce, S. G., Bristol, Conn.
- Glass Tubes.**
Ashcroft Mfg. Co., 111 Liberty St., N. Y.
- Glue.**
Baeder, Adamson & Co., Phila., Pa.
Russell Cement Co., Gloucester, Mass.
- Grass Catchers.**
Supplee Hardware Co., Phila., Pa.
- Grass Hooks.**
Bruce & Marks Mfg. Co., Gas City, Ind.
- Grinding and Polishing Machines.**
Herrick & Cowell, New Haven, Conn.
Norton Emery Wheel Co., Worcester, Mass.
Washburn Shops, Worcester, Mass.
- Grindstone Dressing Machinery.**
Blake & Johnson, Waterbury, Conn.
- Grindstones.**
Cleveland Stone Co., Cleveland, O.
- Gun Implements.**
Union Hdw. Co., Torrington, Conn.
- Gunpowder. Makers of.**
Lafin & Rand Powder Co., 29 Murray St., N. Y.
- Hand Caris.**
Lansing Wheelbarrow Co., Lansing, Mich.
- Handles.**
Hartwell, E. B., Gallipolis, Ohio.
New York Mallet and Handle Wks., 456 E. Houston St., N. Y.
- Hangers, Door.**
Crunk Hanger Co., Elmira, N. Y.
Lane Bros., Poughkeepsie, N. Y.
Victor Mfg. Co., Newburyport, Mass.
- Hardware Comm'n Merchants.**
Doscher, Martin, 88 Chambers, N. Y.
Field, Alfred & Co., 93 Chambers St., N. Y.
Graham, John H. & Co., 111 Chambers St., New York.
Jacobus, W. H., 90 Chambers, N. Y.
- Hardware Manufacturers.**
Dunlap, C. W., Box 2703, New York.
Kotchkiss, R. S., Bridgeport, Conn.
Russell & Erwin Mfg. Co., Chambers St., New York.
Stearns, E. C. & Co., Syracuse, N. Y.
Union Mfg. Co., 108 Chambers, N. Y.
Yale & Towne Mfg. Co., Stamford, Conn.
- Hardware Mfrs. Agents.**
Bingham, W. Co., Cleveland, O.
Graham, John H. & Co., 113 Chambers, N. Y.
McCoy, Jos. F. Co., 26 Warren St., N. Y.
Sickles, Sweet & Lyon, 35 Barclay, N. Y.
Underhill, Clinch & Co., 94 Chambers St., N. Y.
- Hardware Specialties.**
Acme Shear Co., Bridgeport, Conn.
Relden Machine Co., New Haven, Conn.
Clark Mfg. Co., Buffalo, N. Y.
Empire Portable Forge Co., Lansingburg, N. Y.
Enterprise Mfg. Co., Philadelphia, Pa.
Eute & Henger Mfg. Co., St. Louis, Mo.
Gwiner Mfg. Co., Hamilton, O.
Haines & Zimmerman, Phila., Pa.
Hart, H. C. Mfg. Co., Detroit, Mich.
Johnson, S. C., Racine, Wis.
Knapp & Cowles Mfg. Co., Bridgeport, Conn.
New Britain Hdw. Mfg. Co., New Britain, Conn.
North Bros. Mfg. Co., Philadelphia, Pa.
Peabody & Parks, Troy, N. Y.
Shepard, Sidney & Co., Buffalo, N. Y.
Weiland, Chas., 149 Chambers St., N. Y.
Wilson, J. Fred, Worcester, Mass.
Underhill, Clinch & Co., 94 Chambers Street, N. Y.
- Hardware, Yacht and Ship.**
Ferdinand, L. W. & Co., Boston, Mass.
- Harness Snaps.**
Covert Mfg. Co., West Troy, N. Y.
Coverts' Saddlery Wks., Farmer, N. Y.
Fitch, W. & E. T., New Haven, Conn.
- Hay Knives.**
Bruce & Marks Mfg. Co., Gas City, Ind.
Holt, Hiram, Co., E. Wilton, Me.
- Holisting Machines.**
Box, Alfred & Co., 314 Green, Phila.
Jarrow Holisting & Conveying Mch. Co., Cleveland, Ohio.
Copeland & Bacon, 85 Liberty St., N. Y.
Fulton Iron & Engine Wks., Detroit, Mich.
Harrington, E. & Son & Co., Phila.
Lane Bros., Poughkeepsie, N. Y.
Lidgerwood Mfg. Co., 98 Liberty, N. Y.
Maria & Beekley, Philadelphia.
Moore Mfg. & Fdy. Co., Milwaukee, Wis.
Morse, Williams & Co., Phila.
Sellers, Wm. & Co., Phila. and N. Y.
Speidel, J. G., Reading, Pa.
Yale & Towne Mfg. Co., Stamford, Ct.
- Hollow Ware.**
Bronson Supply Co., Cleveland, Ohio.
Cleveland Stamping & Tool Co., Cleveland, O.
- Hollow Ware, Aluminum.**
Illinois Pure Aluminum Co., Lemont, Ill.
- Horse and Barbers' Clippers.**
Hotchiss, E. S., Bridgeport, Conn.
- Horse Nails, Makers of.**
National Horse Nail Co., Vergennes, Vt.
- Horse and Mule Shoes. Makers of.**
Bryden Horse Shoe Co., Catsanqua, Pa.
Burden Iron Co., Troy, N. Y.
Creighton Horse Shoe & Iron Co., Max Meadows, Va.
Diamond State Iron Co., Wilmington, Del.
Ol Dominion Iron & Nail Works Co., Richmond, Va.
Phoenix Horse Shoe Co., Poughkeepsie, N. Y.
Rhode Island Perkins Horse Shoe Co., Providence.
Shoenberger & Co., Pittsburgh, Pa.
Standard Horse Shoe Co., Boston, Mass.
- Hose.**
N. Y. Belting & Packing Co., Ltd., 15 Park Row, N. Y.
- Hydrants, &c.**
McLean, John, 296 & 298 Monroe, N. Y.
- Hydraulic Jacks.**
Dudgeon, Richard, 24 Columbia, N. Y.
Watson & Stillman, 204 E. 43d, N. Y.
- Ice-Cream Freezers.**
North Bros. Mfg. Co., Phila., Pa.
Paeker, C. W., Philadelphia, Pa.
White Mountain Freezer Co., Nashua, N. H.
- Ice Shavers.**
Enterprise Mfg. Co., Philadelphia, Pa.
- Injectors.**
Eynon-Evans Mfg. Co., Philadelphia, Pa.
Jenkins Bros., New York.
Sherwood Mfg. Co., Buffalo, N. Y.
- Insurance, Boiler.**
Hartford Steam Boiler Inspection & Insurance Co., Hartford, Conn.
- Iron and Steel, Swedish.**
Lundberg, Gustaf, Boston, Mass.
Milne, A. & Co., 1 Broadway, N. Y.
- Iron Commission Brokers.**
Corning, Edw. & Co., 39 B'way, N. Y.
Cotton, Bradley & Co., Philadelphia.
Euting, Edw. J., Philadelphia.
Gogan, John L. & Co., Philadelphia, Pa.
Hoffman, J. W. & Co., Philadelphia.
Levis, Henry & Co., Philadelphia.
Kesley, Jerome & Co., Philadelphia.
Lee, J. Tatnall & Co., Philadelphia.
Mohr, J. J., 480 Walnut, Philadelphia.
Phillips & Crane, Philadelphia, Pa.
Sibell, Geo. H. & Co., Chicago, Ill.
Wister, L. & R. & Co., Phila., Pa.
- Iron Ore.**
Naylor & Co., 45 Wall, N. Y.
Pulman, J. Wesley, Phila., Pa.
Samuel, Frank, Philadelphia, Pa.
- Iron, Merchants.**
Barnes, C. K. & Co., Philadelphia, Pa.
Borden & Lovell, 70 West, N. Y.
Bussenius & Cunliffe, Philadelphia.
Corning Edw. & Co., 29 B'way, N. Y.
Cox, Justice, Jr., Philadelphia.
Cotton, Bradley & Co., Philadelphia.
Hoffman, J. W. & Co., Philadelphia.
Leonard, J., 446 West St., N. Y.
Naylor & Co., 45 Wall St., N. Y.
Nicolls, Wheeler & Co., Philadelphia.
Ogden & Wallace, 85 Elm St., N. Y.
Pearson & Co., 29 Broadway, N. Y.
Thomson, W. H. & Co., Phila., Pa.
Wallace, Wm. H. & Co., Albany & Washington streets, N. Y.
Whitney, A. R. & Co., 17 B'way, N. Y.
Wilson, E. H. & Co., Philadelphia.
- Iron, Importers.**
Abbott Wheelock & Co., N. Y. and Boston.
Lundberg, Gustaf, Boston, Mass.
- Iron, Sheet. Manufacturers of.**
Cambridge Iron & Steel Co., Cambridge Ohio.
W. Dewees Wood Co., Lim., McKeesport, Pa.
- Ironwork, Ornamental.**
Barnum, E. T., Detroit, Mich.
Champion Iron Co., Kenton, O.
Lange Fence & Wire Co., St. Louis, Mo.
Ludlow-Saylor Wire Co., St. Louis, Mo.
Mast, Focs & Co., Springfield, O.
The Van Dorn Iron Works Co., Cleveland, O.
- Keys.**
Wollensak, J. F., Chicago, Ill.
- Ladies.**
Detroit Fdy. Equipment Co., Detroit, Mich.
- Lamp Stoves.**
Glazier Stove Co., Chelsea, Mich.
- Lanterns.**
Ohio Lantern Co., Tiffin, Ohio.
Steam Gauge & Lantern Co., Syracuse, N. Y.
- Lathes.**
Draper Machine Tool Co., Worcester, Mass.
Johnson, Israel H., Jr., & Co., Philadelphia, Pa.
Seneca Falls Mfg. Co., Seneca Falls, N. Y.
- Lathing, Wire.**
Clinton Wire Cloth Co., Clinton, Mass.
N. J. Wire Cloth Co., Trenton, N. J.
Wright & Colton Wire Cloth Co., Worcester, Mass.
- Lawn Mowers.**
Chadborn & Coldwell Mfg. Co., Newburgh, N. Y.
Champion Mfg. Co., Richmond, Ind.
Coldwell Lawn Mower Co., Newburgh, N. Y.
Dille & McGuire Mfg. Co., Richmond, Ind.
F. & N. Mfg. Co., Richmond, Ind.
Henley, M. C., Richmond, Ind.
Lape, W. E., Syracuse, N. Y.
Mast, Focs & Co., Springfield, O.
Stearns, E. C. & Co., Syracuse, N. Y.
Supplee Hdw. Co., Phila., Pa.
- Lawn Rakes.**
Gibbs Mfg. Co., Canton, Ohio.
Konier, F. E. & Co., Canton, O.
Schaeffer & Co., Dayton, Ohio.
Syracuse Specialty Mfg. Co., Syracuse, N. Y.
- Lawn Sprinklers.**
Ette & Henger Mfg. Co., St. Louis.
McGowan, John H. Co., Cincinnati, O.
- Lawn Sweepers.**
Lape, W. E., Syracuse, N. Y.
- Lemon Squeezers.**
Ripley Mfg. Co., Unionville, Conn.
- Letters and Figures, Metallic.**
White, A. A. & Co., Providence, R. I.
- Letters, Paper.**
Tablet & Ticket Co., Chicago, Ill.
- Levels.**
Davis & Cook, Watertown, N. Y.
Richardson, O. F., & Son Athol, Mass.
- Locks & Knobs, Manufacturers of.**
Deitz, A. E., 97 Chambers, N. Y.
Keyless Lock Co., Chicago, Ill.
Reading Hdw. Co., Reading, Pa.
Romer & Co., Newark, N. J.
Smith & Egge Mfg. Co., Bridgeport, Conn.
Yale & Towne Mfg. Co., Stamford, Conn.

Machinery.

Am. Tool Works, Cleveland, Ohio.
 Barnes, W. F. & John, Rockford, Ill.
 Sement, Miles & Co., Philadelphia, Pa.
 Sigel, O. E., 45 Day, N. Y.
 Bignall & Keeler Mfg. Co., St. Louis.
 Birmingham Iron Foundry, Birmingham, Conn.
 Bliss, E. W. Co., Brooklyn, N. Y.
 Bogert, Jno. L., Flushing, N. Y.
 Briggs, Marvin, 12 Broadway, N. Y.
 Carlin's Sons, Thos., Allegheny, Pa.
 Chm. Milling Mch. Co., Cincinnati, Ohio.
 Clapp, Geo. M., agt., 74 Cortlandt, F. Y.
 Coulter & McKenzie Mch. Co., Bridgeport, Conn.
 Crulikshank, D. B., Providence, R. I.
 Dietrick & Harvey Mch. Co., Baltimore, Md.
 Fitchburg Mch. Works, Fitchburg, Mass.
 Garvin, Mch. Co., Laight & Canal Sts.
 Gould & Eberhardt, Newark, N. J.
 Hamilton Mch. Tool Co., Hamilton, O.
 Harrington, E. Son & Co., Phila., Pa.
 Henderer, A. L., Wilmington, Del.
 Hender Machine Co., Torrington, Ct.
 Hendley Mch. Tool Wks., Richmond, Ind.
 Hill, Clarke & Co., Boston, Mass.
 Johnson, Israel H., Jr., & Co., Phila.
 Jones & Lamson Mch. Co., Springfield, Vt.
 Lodge & Shipley Mch. Tool Works, Cincinnati, O.
 Lovegrove & Co., Philadelphia, Pa.
 McCabe, J. J., 68 Cortlandt, N. Y.
 Machinists Supply Co., Rochester, N. Y.
 Manville, E. J. Mch. Co., Waterbury, Conn.
 National Machinery Co., Tiffin, Ohio.
 Newark Mch. Tool Works, Newark, N. J.
 New Haven Mfg. Co., New Haven, Conn.
 New York Mach'y Depot, N. Y.
 Niles Tool Wks., 138 Liberty St., N. Y.
 Pittsburgh Mfg. Co., Pittsburgh, Pa.
 Place, Geo., 120 Broadway, N. Y.
 Poole, Robt. & Son Co., Baltimore, Md.
 Powell Planer Co., Worcester, Mass.
 Pratt & Whitney Co., Hartford, Conn.
 Prentiss Tool & Supply Co., N. Y.
 Scranton Supply & Mchry. Co., Scranton, Pa.
 Sellers, Wm. & Co., Phila.
 Seyfert's Sons L. F., Philadelphia, Pa.
 Steptoe, J. & Co., Cincinnati, O.
 Stow Flexible Shaft Co., La., Phila.
 Toomey, Frank, Philadelphia, Pa.
 Wetherill, Robert & Co., Chester, Pa.
 Wilson, W. A., Rochester, N. Y.

Machinery for Hardware Manufacture.

Adt, Jno. & Son, New Haven, Conn.

Machine Knives.

Loring Coes & Co., Worcester, Mass.

Machine Screws.

New Britain Hdw. Mfg. Co., New Britain, Conn.

Machine Tools.—See Machinery.**Machine Work.**

Papping, J., 58th St., & 11th Ave., N. Y. City.

Machinists' Scales.

Coffin & Leighton, Syracuse, N. Y.

Starrett, L. & B. H. Mass.

Vallentine Tool Co., Hartford, Conn.

Machinists' Tools and Supplies.

King, J. M. & Co., Waterford, N. Y.

Sellers, Wm. & Co., Inc., Phila.

Mallets.

N. Y. Mallet & Handle Works, N. Y.

Manufacturing Sites.

Chicago, Milwaukee & St. Paul R. R., Chicago, Ill.

Measuring Tapes.

Keuffel & Esser Co., 127 Fulton St., N. Y.

Lufkin Rule Co., Saginaw, Mich.

Meat Cutters and Stuffers.

Enterprise Mfg. Co., Philadelphia, Pa.

Russell & Erwin Mfg. Co., New York.

Mechanical Instruction.

Correspondence School of Mechanics, Scranton, Pa.

Metals.

Fearing, Wm. S., 100 Chambers, F. Y.

Hendricks Bros., 49 Cliff, N. Y.

Naylor & Co., 45 Wall, N. Y.

Metal Brokers.

American Metal Co., N. Y.

Metalburgists.

Britton J. Blodgett, Phila.

Milling Machines.

Chm. Milling Mch. Co., Cincinnati, Ohio.

Mining Knives.

Palmer Hdw. Mfg. Co., Troy, N. Y.

Mine Lamps.

Darby, Edw. & Sons, Phila. Pa.

Leonard, B. E., Scranton, Pa.

Mining Screens.

Harrington & King Perforating Co., Chicago, Ill.

Howard & Morse, 45 Fulton, N. Y.

Mirrors.

Rice, C. F., Chicago, Ill.

Molding Sand.

Obermayer, S. Co., Cincinnati, O.

Faxon, J. W. & Co., Phila.

Motors, Water and Electric.

C. & O. Electric Co., 402 and 404

Greenwich St., N. Y.

Dallett, Thos. H. & Co., Phila., Pa.

Mail Machinery.

Pittsburgh Mfg. Co., Pittsburgh, Pa.

Nails (Cut) and Spikes.

Borden & Lovell, 70 West, N. Y.

Cumberland Nail & Iron Co., Phila.

Oxford Iron Co., 81 Washington,

Pottstown Iron Co., Pottstown, Pa.

Riverside Iron Wks., Wheeling, W. Va.

Neck Yokes.

Johnson, S. C., Racine, Wis.

Nickel Platers' Supplies.

Colburn Electric Mfg. Co., Fitchburg, Mass.

Hanson & Van Winkle Co., Newark, N. J.

Zucker & Levett Chemical Company, 10 to 14 Grand St., N. Y.

Norway Shapes, Rollers of.

Rowland, William & Harvey, Frankford, Philadelphia

Novelty Manufacturers.

Franklin, H. H. Mfg., Syracuse, N. Y.

Nut Machines.

Dunham Nut Mch. Co., Unionville, Ct.

Nuts, Bolts, &c., Makers of.

American Bolt Co., Lowell, Mass.

American Screw Co., Providence, R. I.

Blake & Johnson, Waterbury, Conn.

Taskell, Wm. H. Co., Pawtucket, R. I.

Mt. Carmel Bolt Co., Mt. Carmel, Conn.

Port Chester Bolt and Nut Co., Port Chester, N. Y.

Russell, Burdall & Ward, Port Chester, N. Y.

Sternberg, J. B. & Son, Reading, Pa.

Wilson, J. Fred., Worcester, Mass.

Wm. H. Haskell Co., Pawtucket, R. I.

Oil Cans and Lubricators.

Sherwood Mfg. Co., Buffalo, N. Y.

Oilers.

Wilmet & Hobbs Mfg. Co., Bridgeport, Conn.

Oil Stones.

Pike Mfg. Co., Pike Station, N. H.

Oil Stoves.

Glazier Stove Co., Chelsea, Mich.

Orange Shears.

Henry, J. T., Mfg. Co., Hamden, Conn.

Ores.

Wister, Francis, Philadelphia, Pa.

Px Sheers.

Scranton Forging Co., Scranton, Pa.

Packing.

Morrison, Robt., St. Louis, Mo.

N. Y. Belting & Packing Co. Ltd., N. Y.

Padlocks.

Ames Sword Co., Chicopee, Mass.

Fraim, E. T., Lancaster, Pa.

Hillebrand & Wolf, Phila., Pa.

Miller Lock Co., Philadelphia, Pa.

Paint.

Dixon, Jos. Crucible Co., Jersey City, N. J.

Paint Burners.

Dangler Stove & Mfg. Co., Cleveland, O.

Paint Cans.

Wilmet & Hobbs Mfg. Co., Bridgeport, Conn.

Patent Solicitors.

Hewson & Rowson, Phila. & Wash'ton.

Jeener, H. W. T., Washington, D. C.

Stocking, E. B., Washington, D. C.

Peanut and Coffee Reaster.

Olsen, A. B., Kansas City, Mo.

Perforated Metal.

Clinton Wire Cloth Co., Clinton, Mass.

Harrington & King Perforating Co., Chicago, Ill.

Hendrick Mfg. Co., Ltd., Carbondale, Pa.

Phosphor Bronze.

Phosphor Bronze Smelting Co., Limited, 512 Arch, Philadelphia.

Phosphor Tin.

Crescent Phosphorized Metal Co., Philadelphia, Pa.

Crosby Steam Gage & Valve Co., Boston, Mass.

Halk & Naumann, 516 Pearl, N. Y.

Picks and Mattocks.

Plumb, Fayette R., Philadelphia, Pa.

Pig Iron.

Houston, C. B. & Co., Philadelphia, Pa.

Montour Iron & Steel Co., Danville, Pa.

Naylor & Co., 45 Wall, N. Y.

Pilling & Crane, Philadelphia, Pa.

Samuel, Frank, Philadelphia, Pa.

Pig Iron Storage.

Am. Pig Iron Storage Warrant Co., 44 Wall, N. Y.

Pile Drivers.

Valcan Iron Wks., Chicago, Ill.

Pipe Bent.

National Pipe Bending Co., New Haven

Pipe Cutting and Threading Machines.

Bignall & Keeler Mfg. Co., St. Louis, Mo.

Marill Mfg. Co., Toledo, O.

Pancoat Henry B. & Co., Philadelphia,

Saunders' Sons, D., Yonkers, N. Y.

Pipe Grips.

Frederick Vise Co., 44 Barclay, N. Y.

Pipes, Fittings, &c., Makers of.

McNab & Hardin Mfg. Co., N. Y.

Pipe, Water and Gas, Makers of.

Cumberland Nail & Iron Co., Phila., Pa.

Edison Iron Co., Emmaus, Pa.

Riverside Iron Works, Wheeling, W. Va.

Wood, R. D. & Co., Philadelphia, Pa.

Plane Irons, Manufacturers of.

Snok Bros., Millbury, Mass.

Planes, Manufacturers of.

Stanley Rule & Level Co., N. Y.

Plate Iron and Steel, Mfrs of.

Atlas-Standard Iron & Steel Co., Bridgeport, O.

Lukes Iron & Steel Co., Coatesville, Pa.

Mahoning Valley Iron Co., Youngstown, Ohio.

Moorehead-McLean Co., Pittsburgh, Pa.

Mollvain & Sons, Reading, Pa.

Pottstown Iron Co., Pottstown, Pa.

Rotsville Iron & Steel Co., Pottsville, Pa.

Singes, Nimick & Co., Pittsburgh, Pa.

The Mahoning Valley Iron Co., Youngstown, O.

Stanton Iron & Steel Co., Thurlow, Pa.

Wood Alan Co., Philadelphia.

Plating, Nickel, Brass and Silver.

Wilmet & Hobbs Mfg. Co., Bridgeport, Conn.

Pokers and Lifters.

Troy Nickel Works, Troy, N. Y.

Polishing Machines.

Watson & Stillman, 204 E. 43d, N. Y.

Polishing Wheel.

La Massena, C. E. & Co., Newark, N. J.

Post Hole Diggers.

Buckeye Mfg. Co., Union City, Ind.

Wister, L. & E. & Co., Philadelphia, Pa.

Poultry Nettings.

Barum, E. T., Detroit, Mich.

Gilbert & Bennett Mfg. Co., 42 Cliff St., N. Y.

N. J. Wire Cloth Co., Trenton, N. J.

"Silver Finish."

Tyler Wire Wks. Co., W. S., Cleveland, O.

Wright & Colton Wire Cloth Co., Worcester, Mass.

Powder.

Lafin & Rand Powder Co., 29 Murray

New York Powder Co., 62 Liberty St., N. Y.

Power Hack Saws.

Millers Falls Co., 93 Reade St., N. Y.

Power Hammers.

Belden Mach. Co., New Haven, Conn.

Olenet & Eisenhardt, Philadelphia.

Jenkins & Linzie, Belleronte, Pa.

Long & Allstatter Co., Hamilton, Ohio.

Presses, Dies, &c.

E. W. Bliss Co., Brooklyn, N. Y.

Crosby, G. A. & Co., Chicago, Ill.

Ferracute Mch. Co., Bridgeport, N. J.

Niagara Stamping & Tool Co., Buffalo, N. Y.

Stark Mch. & Tool Co., Buffalo, N. Y.

Stiles & Parker Press Co., Brooklyn, N. Y.

Waterbury Mch. Co., Waterbury, Conn.

Presses, Power, Makers of.

Bliss, E. W. Co., Brooklyn, N. Y.

Manville, E. J. Mch. Co., Waterbury, Ct.

Merriman, A. H., Meriden.

Niagara Stamping and Tool Co., Buffalo, N. Y.

Robinson, J. M. & Co., Cincinnati, O.

Stark Mch. & Tool Co., Buffalo, N. Y.

Waterbury Foundry and Machine Co., Waterbury, Conn.

Pulleys.

Keystone Clutch Mch. Wks., Phila.,

Lake, J. H. & D. Co., Massillon, Ohio.

Reeves Pulley Co., Columbus, Ind.

Pulley Fixings.

Foley, J. W. & Co., Cincinnati, O.

Pulverizing Mill.

Bradley Fertilizer Co., Boston, Mass.

Pumping Machinery.

Coulter & McKenzie Mch. Co., Bridgeport, Conn.

Dean Bros. Steam Pump Works, Indianapolis, Ind.

Hooker-Colyville Steam Pump Co., Chicago, Ill.

Lucas, C. O. & Co., Greenville, Ohio.

McGowan, J. H. & Co., Cincinnati, O.

Maslin, J. & Son, Jersey City, N. J.

Norwalk Iron Wks. Co., So. Norwalk, Conn.

Southwark Fdy. & Mch. Co., Phila., Pa.

Valley Pump Wks., Easthampton, Mass.

Worthington, Henry R., 86 & 88 Liberty St., N. Y.

Pumps, Makers of.

Bellevue Pump Co., Bellevue, Iowa.

Flaming Co., Salem, O.

Douglas, W. & B., Middletown, Conn.

Mast, Foss & Co., Springfield, O.

Myers, F. E. & Bro., Ashland, O.

Punches and Shears, Hand and Power.

Allentown Rolling Mill. Allentown, Pa.
Lockhart Iron & Steel Co., Pittsburg, Pa.
Passaic Rolling Mill Co., Paterson, N.J.
Pottsville Iron & Steel Co., Pottsville, Pa.
Roberts, A. & P. Co., Phila., Pa.
The Phoenix Iron Co., Phila., Pa.
Tudor Iron Works, St. Louis, Mo.

Shears and Scissors.
Aeme Shear Co., Bridgeport, Conn.
Heinrichs, R. Sons Co., Newark, N.J.

Sheet Iron and Steel, Manufacturers of.
Etna-Standard Iron and Steel Co., Bridgeport, O.
Cambridge Iron & Steel Co., Cambridge, Ohio.
Chess Bros., Pittsburg, Pa.
Mahoning Valley Iron Co., Livingston, Ohio.
Moorehead-McCleane Co., Pittsburg, Pa.
Pierion & Co., 29 Broadway, N.Y.
Relly, John W., Fort Hunter P.O., Pa.
Singer, Nimick & Co., Ltd., Pittsburgh, Pa.
The Mahoning Valley Iron Co., Youngstown, O.
Alan Wood Co., Philadelphia.
W. Dewees Wood Co., McKeesport, Pa.

Sheet Metal Work.
Clark & Cowles, Plainville, Conn.

Sheet Zinc.
Matthiessen & Hegeler Zinc Co., La Salle, Ill.

Shelf Brackets.
Koch, A. B. & Co., Peoria, Ill.

Shipping Blanks.
Barlow Bros., Grand Rapids, Mich.

Slabs.
Douglas, W. & B., Middletown, Conn.

Skates, Ice.
Dame, Stoddard & Kendall, Boston, Mass.
Sickels, Sweet & Lyon, 55 Barclay St., N.Y.
Winslow, Sam'l., Skate Mfg. Co., Worcester, Mass.

Skates, Roller.
Henley, M. C., Richmond, Ind.
Union Hardware Co., Torrington, Conn.
Winslow, Sam'l., Skate Mfg. Co., Worcester, Mass.

Smelting Works.
Reeves, Paul S., 760 S. Broad, Phila.

Soldering Coppers.
Clendenin Bros., Baltimore, Md.

Speaking Tubes.
Ostrander, W. R. & Co., 204 Fulton St., N.Y.
Wollensak, J. F., Chicago, Ill.

Specialties, Pat. Articles.
Konigsow, O., Cleveland, O.

Speed Indicators.
Church & Slight, 109 Fulton St., N.Y.

Spelter.
Matthiessen & Hegeler Zinc Co., La Salle, Ill.

Spoons and Forks.
Boardman, L. & Son, New Haddam, Conn.
Holmes & Edwards Silver Co., Bridgeport, Conn.

Rogers, The Wm. Mfg. Co., Hartford, Conn.
Rogers & Hamilton Co., Waterbury, Conn.

Sporting Goods.
Hartley & Graham, 313-315 E'way, N.Y.

Spring Hinges.
American Spiral Spring Co., Pittsburgh, Pa.
Dunbar Bros., Bristol, Conn.

Miller & Van Winkle, Brooklyn, N.Y.
Morgan Spring Co., Worcester, Mass.
Nourse, Fred. Co., 315 to 319 E. 22d St., N.Y.

Roland, Wm. & Harvey, Phila., Pa.
Sabin Machine Co., Montpelier, Vt.
Tuck Mfg. Co., Brockton, Mass.
Washburn & Moen Mfg. Co., Worcester, Mass.

Wolf, R. H. & Co., Ltd., 118th St. and Harlem River, N.Y.

Spring Hinges.
Bardley, J., 149 & 151 Baxter St., N.Y.
Pulman Sash Balance Co., Rochester, N.Y.

Stover Mfg. Co., Freeport, Ill.
Van Wagoner & Williams Co., 14 Warren St., N.Y.

Sprinklers.
Smith, Oliver A., Clarkston, Mich.

Stamped Ware.
Am. Stamping Co., 104 & 106 John St., New York

Stamping Works.
Cleveland Stamping & Tool Co., Cleveland, O.

Staples.
Cobb & Drew, Plymouth, Mass.
Titchener E. H. & Co., Binghamton, N.Y.

Steam Gauges.
Ashcroft Mfg. Co., 111 Liberty St., N.Y.
Bristols Mfg. Co., Waterbury, Conn.

Steam Hammers, &c., Makers of.
Dienelt & Eisenhardt, Philadelphia.
Dudgeon, Richard, 24 Columbia Street, N.Y.
Trethewey Mfg. Co., Pittsburgh, Pa.

Steam Heating.
Webster Warren & Co., Camden, N.J.

Steam Separators.
Goubert Mfg. Co., 32 Cortland St., N.Y.
Harrison Safety Boiler Wks., Phila.

Steel, Cold Rolled Strip.
Wilmot & Hobbs Mfg. Co., Bridgeport, Conn.

Steel Figures and Alphabets.
Crossrud, W., 61 Fulton, N.Y.
Wolf, C. H., 177 William St., N.Y.

Steel Importers.
Abbott, Wheelock & Co., N.Y. and Boston.
Hobson, Francis, Seaman & Co., 97 John St., N.Y.
Jessop, Wm. & Sons, Sheffield, England, or 91 John, N.Y.
Milne, A. & Co., 1 Broadway, N.Y.
Newton & Shipman, 83 John, N.Y.
Wetherell Bros., 93 Liberty St., N.Y.
Whitney, A. R. & Co., B'way, N.Y.
Wolf, R. H. & Co., Ltd., 118th Street and Harlem River, N.Y.

Steel (Mushet's Special).
Jones, B. M. & Co., Boston.

Steel Manufacturers.
Etna-Standard Iron & Steel Co., Bridgeport, O.
Bethlehem Iron Co., S. Bethlehem, Pa.
Barber, Herman & Co., 103 Duane St., New York.
Carbor Steel Co., Pittsburgh, Pa.
Chester Steel Castings Co., Phila., Pa.
Chrome Steel Works, Brooklyn, N.Y.
Creusot Steel Co., Pittsburgh, Pa.
Elken & Co., Hagen, Germany.
Frankford Steel Co., Philadelphia.
Gaudier Steel Department of Cambria Iron Co., Johnstown, Pa.
Hobson, Francis, Seaman & Co., 97 John St., N.Y.
Jessop, Wm. & Sons, Sheffield, England, or 91 John, N.Y.
Kayser, Ellison & Co., Sheffield, Eng.
La Belle Steel Co., Pittsburgh, Pa.
Lukens Iron & Steel Co., Coatesville, Pa.
Moorehead-McCleane Co., Pittsburg, Pa.
Moss, F. W., 83 John, N.Y.
Naylor & Co., 45 Wall, N.Y.
Pottsville Iron and Steel Co., Pottsville, Pa.
Relly, J. W., Fort Hunter P.O., Pa.
Roland, Wm. & Harvey, Frankford, Philadelphia.
Singer, Nimick & Co., Pittsburgh.
Stanley Works, New Britain, Conn.
Steel & Iron Improvement Co., Pittsburgh, Pa.
Taylor Iron & Steel Co., High Bridge, N.J.
Wardlaw, S. & Co., Sheffield, Eng.
Wetherell Bros., 93 Liberty St., N.Y.
Wilmot & Hobbs Mfg. Co., Bridgeport, Conn.

Steel, Manufacturers' Agents.
Barnes, C. K. & Co., Philadelphia, Pa.
Corning, Edw. & Co., 29 B'way, N.Y.
Frasse Co., 19 Warren St., New York.
Landray, Jas. G. & Co., Phila., Pa.
Pierion & Co., 29 Broadway, N.Y.

Steel Rails, Manufacturers of.
Bethlehem Iron Co., S. Bethlehem, Pa.
Cambria Iron Co., Johnstown, Pa.
McMour Iron & Steel Co., Danville, Pa.
Riverside Iron Wks., Wheeling, W. Va.

Steel, Tool.
Frankford Steel Co., Philadelphia, Pa.
Jessop, Wm. & Sons, Sheffield, England, or 91 John, N.Y.
Jones, B. M. & Co., Boston, Mass.
La Belle Steel Co., Pittsburgh, Pa.

Steel Wheels.
Lillenberg, M. N., 150 Broadway, N.Y.

Step Ladders.
Bicycle Step Ladder Co., Chicago, Ill.
Croissant, M., Albany, N.Y.

Stocks and Dies.
Armstrong Mfg. Co., Bridgeport, Conn.
Billings & Spencer Co., Hartford, Conn.
Butterfield & Co., Derby Line, Vt.
Hart Mfg. Co., Cleveland, O.
Saunders' Sons, D., Yonkers, N.Y.
Wells Bros. & Co., Greenfield, Mass.
Wiley & Russell Mfg. Co., Greenfield, Mass.

Storage.
Security Warehouse, E. St. Louis, Ill.

Stove Linings.
Ostrander Fire Brick Co., Troy, N.Y.

Stove Pipe Thimbles.
Cheney, S. & Son, Manlius, N.Y.

Stove Trimmings.
Troy Nickel Works, Troy, N.Y.

Stove Trucks.
Gwinner Mfg. Co., Hamilton, O.

Street Lamps.
Steam Gauge & Lantern Co., Syracuse, N.Y.

Strops.
Electric Cutlery Co., 113 Chambers, N.Y.
J. R. Torrey & Co., Worcester, Mass.

Structural Iron Work.
Berlin Iron Bridge Co., East Berlin, Conn.
Boston Bridge Wks., Boston, Mass.
Lindsay, Jas. G. & Co., Phila., Pa.
Wrought Iron Bridge Co., Canton, O.

Sulphuric Acid.
Matthiessen & Hegeler Zinc Co., La Salle, Ill.

Tacks, Brads, Staples, &c.
Atlas Tack Corporation, Boston, Mass.
Clendenin Bros., Baltimore, Md.
Cobb & Drew, Plymouth, Mass.
Grand Crossing Tack Co., Grand Crossing, Ill.

Nut Screw & Tack Co., Cleveland, O.
Phillips, E. & Sons, South Hanover.
Plymouth Mills, Plymouth, Mass.
Traftant, W. E., Whitman, Mass.

Tank Heaters.
Hunt, Helm & Ferris, Harvard, Ill.

Taps and Dies.
Butterfield & Co., Derby Line, Vt.
Carpenter, J. M., Tap & Die Co., Pawtucket, R. I.

Manning, Maxwell & Moore, 111 Liberty St., N.Y.
Wells Bros. & Co., Greenfield, Mass.
Wiley & Russell Mfg. Co., Greenfield, Mass.

Testing Laboratories.
Riehle Bros. Testing Mch. Co., Philadelphia.

Testing Machines.
Riehle Bros. Testing Mch. Co., Phila.

Theatrical Hardware.
Wollensak, J. F., Chicago, Ill.

Thill Springs.
Frost Thill Spring Co., Boston, Mass.
Sabin Machine Co., Montpelier, Vt.

Time Record.
Soattergood, H. W., Phila., Pa.

Tinners' Hardware.
Serger Bros., Philadelphia, Pa.

Tinning Process.
Sands, Thomas, Nashua, N.H.

Tin Plate Machinery.
Lloyd Booth Co., Youngtown, Ohio.

Tinware.
Am. Stamping Co., 104 & 106 John St.

Tire Upsetters.
Butts & Ordway, Boston, Mass.

Toe Calks, Steel.
Burke, P. F., Boston, Mass.

Tool Chests.
Am. Tool Co., 200 W. Houston St., N.Y.

Tools.
Stow, R. H. & Co., New Haven, Conn.
Frasse Co., 19 Warren St., New York.
Fray, Jno. S. & Co., Bridgeport, Conn.
Mayhew, H. H. Co., Shelburne Falls, Mass.

Millers Falls Co., 98 Reade, N.Y.
Richardson, O. F. & Son, Athol, Mass.
Standard Tool Co., Athol, Mass.
Stearns Bros., 29 Chambers, New York.
Starrett, L. S., Athol, Mass.

Tower & Lyon, 95 Chambers St., N.Y.

Tools, Blacksmith and Wheelwrights.
Butts & Ordway, Buffalo, N.Y.
Butts & Ordway, Boston, Mass.

Champion Blower & Forge Co., Lancaster, Pa.
Plumb, Fayette R., Philadelphia, Pa.
Wiley & Russell Mfg. Co., Greenfield, Mass.

Tools, Steam and Gas Fitters'.
Saunders' Sons, D., Yonkers, N.Y.

Torches, Oil and Gasolene.
Dancer Mfg. Co., Cleveland, O.
Schneider & Trenkamp Co., Cleveland, Ohio.

Transom Lifters.
Wollensak, J. F., Chicago, Ill.

Tree Protectors.
McCallip Fence & Wire Wks., Columbus, Ohio.

Trucks, Manufacturers of.
Berger Bros., Philadelphia, Pa.
Boston & Lockport Block Co., Boston, Mass., and Lockport, N.Y.

Clark, G. P., Windsor Locks, Conn.
Lansing Wheelbarrow Co., Lansing, Mich.

Tubes, Seamless Drawn Copper.
Ansonia Brass & Copper Co., 19 and 21 Cliff, N.Y.
Randolph & Clowes, Waterbury, Conn.

Tubes, Steel.
Leng's John S. Son & Co., 4 Fletcher St., New York.
Mannesmann Tube Co. Ltd., Landore, England.

Shelby Steel Tube Co., Shelby, O.

Tumbling Barrels.
Henderson Bros., Waterbury, Conn.

Turnbuckles.
Central Iron & Steel Co., Brazil, Ind.
Morse Twist Drill & Machine Co., New Bedford, Mass.

New Process Twist Drill Co., Taunton, Mass.
Standard Tool Co., Cleveland.

Valves, Gas, Water and Steam.
Best, Fox & Co., Pittsburgh, Pa.
Chapman Valve Mfg. Co., Boston.
Eynon-Evans Mfg. Co., Philadelphia, Pa.

Jenkins Bros., 71 John, N.Y.
McNab & Harlin Mfg. Co., 56 John N.Y.
Mason Regulator Co., Boston, Mass.

Ventilating Fans.
Huyett & Smith Mfg. Co., Detroit, Mich.

Ventilator Appliances.
Howard & Morse, 45 Fulton, N.Y.

Vise Jaws.
Newark Mch. Tool Co., Newark, N.J.

Vises.
Capital Mch. Tool Co., Auburn, N.Y.
Hollands Mfg. Co., Erie, Pa.
Howard Iron Works, Buffalo, N.Y.
Millers Falls Co., 98 Reade St., N.Y.
Prentiss Vise Co., 44 Barclay, N.Y.

Tower & Lyon, 95 Chambers St., N.Y.
Van Wagoner & Williams Co., 14 Warren St., N.Y.

Wagon Jacks.
Boston & Lockport Block Co., Boston, Mass., and Lockport, N.Y.

Covert Mfg. Co., West Troy, N.Y.
Covert's Saddle Works, Farmer, N.Y.

Washers.
Reckell, Wm. H. Co., Plattsburgh, R. I.
Milton Mfg. Co., Milton, Pa.
Sternbergh, J. H. & Son, Reading, Pa.

Washing Machines.
Neff, W. H., Cowan, Ind.
Wayne, A. Mfg. Co., Ft. Wayne, Ind.

Water Meters.
Worthington, Henry R., 86 & 88 Liberty St., N.Y.

Water Wheels.
Poole, Robt. & Son Co., Baltimore, Md.

Wheelbarrows.
Akron Tool Co., Akron, O.
Amer. Steel Scraper Co., Sidney, Ohio

Cockburn Barrow & Mch. Co., Jersey City, N.J.
Kilbourne & Jacobs Mfg. Co., Columbus, Ohio.
Lansing Wheelbarrow Co., Lansing, Mich.
Sidney Steel Scraper Co., Sidney, O.
Sweatt Mfg. Co., Minneapolis, Minn.

Wheels.
Arnold Metal Wheel Co., New London, Ohio.

Whips.
American Whip Co., Westfield, Mass.

Window Cord, Makers of.
Samson Cordage Works, Boston, Mass.

Wire, Manufacturers of.
Amer. Spiral Spring Co., Pittsburg, Pa.
Consolidated Steel & Wire Co., St. Louis, Mo.

Gaudier Steel Department of Cambria Iron Co., Johnstown, Pa.
Miller & Van Winkle, Brooklyn, N.Y.
New Castle Wire Nail Co., New Castle, Pa.

New Haven Wire Mfg. Co., New Haven, Conn.
Prentiss, Geo. W. & Co., Holyoke, Mass.
Salem Wire Nail Co., Salem, O.
Trenton Iron Co., Trenton, N.J.

Washburn & Moen Mfg. Co., Worcester.
Wetherell Bros., 93 Liberty St., N.Y.
Wolf, R. H. & Co., Ltd., 118th St. and Harlem River, N.Y.

Wright & Colton Wire Cloth Co., Worcester, Mass.

Wire Cloth.
Barnum, E. T., Detroit, Mich.
Clinton Wire Cloth Co., Clinton, Mass.

Darby, Edward & Sons, Philadelphia.
Ester, W. S., 65 Fulton, N.Y.
Gilbert & Bennett Mfg. Co., 42 Cliff, N.Y.

Howard & Morse, 45 Fulton, N.Y.
N. J. Wire Cloth Co., Trenton, N.J.
Reliance Wire & Iron Wks., Milwaukee, Wis.

Scheeler & Sons, Buffalo, N.Y.
Wickwire Bros., Cortland, N.Y.
Wright & Colton Wire Cloth Co., Worcester, Mass.

W. S. Tyler Wire Works Co., Cleveland.

Wire Cutters.
Cronk Hanger Co., Elmira, N.Y.

King, J. M. & Co., Watertown, N.Y.

Wire Dies.
McFarland, Wm., Trenton, N.J.

Newton & Shipman, 83 John, N.Y.

Wire Door Mats.
Hartman Mfg. Co., Elwood City, Pa.
Horrook, Joshua, 45 Cliff St., N.Y.

Wire Fences.—See Fencing, Iron and Wire.

Wire Goods, Manufacturers of.
Darby, Edward & Sons, Phila.
Gilbert & Bennett Mfg. Co., 42 Cliff St., N.Y.

Lange Fence & Wire Co., St. Louis, Mo.
Ludlow-Saylor Wire Co., St. Louis.
Ossawatimie Co., Norwich, Conn.

Scheeler & Sons, Buffalo, N.Y.
Wickwire Bros., Cortland, N.Y.
Williamson, C. T. Wire Novelty Co., Newark, N.J.

Wire Machinery.
Am. Tool Wks., Cleveland, O.
Manville, E. J. Mch. Co., Waterbury, Ct.

Morgan Construction Co., Worcester, Mass.
Waterbury Mch. Co., Waterbury, Conn.

Wire Straightening and Cutting Machinery.
Adt, John & Son, New Haven, Conn.

Wire Nails.
Consolidated Steel & Wire Co., St. Louis, Mo.
Indiana Wire Fence Co., Crawfordville, Ind.

Kilmer Mfg. Co., Newburg, N.Y.
New Castle Wire Nail Co., New Castle, Pa.

Phillips, E. & Sons, South Hanover, Mass.
Phillips, Townsend & Co., Phila., Pa.
Plymouth Mills, Plymouth, Mass.

Salem Wire Nail Co., Salem, O.
Whitney, A. R. & Co., New York City

Wire Rads, Steel.
Consolidated Steel & Wire Co., St. Louis, Mo.
New Castle Wire Nail Co., New Castle, Pa.

Washburn & Moen Mfg. Co., Worcester, Mass.

Whitney, A. R. & Co., 17 B'way, N.Y.
Wolf, R. H. & Co., Ltd., 118th Street and Harlem River, N.Y.

Wire Rope, Iron and Steel Makers.
Broderick & Bascom Rope Co., St. Louis, Mo.

California Wire Works, San Francisco.
Hazard Mfg. Co., Wilkesbarre, Pa.
A. Leschen & Sons, St. Louis.

Trenton Iron Co., Trenton, N.J.
Washburn & Moen Mfg. Co., Worcester, Mass.

Williamsport Wire Rope Co., Williamsport, Pa.

ALPHABETICAL INDEX TO ADVERTISERS.

Abbott, Wheelock & Co.....	20	Buffalo Edge Tool Works.....	80	Dallett, Thos. H. & Co.....	5	Hamilton Machine Tool Co.....	50
Acme Shear Co.....	81	Buffalo Specialty Mfg. Co.....	115	Dame, Stoddard & Kendall.....	90	Hammer & Co.....	108
Adt, John & Son.....	46	Bullock Bellows Co.....	48	Dangler Stove & Mfg. Co.....	73	Hanson & Van Winkle Co.....	33
Adna-Standard Iron & Steel Co.....	22	Burden Iron Co.....	108	Darby, Edw. & Sons.....	8	Hardware Board of Trade.....	64
Aiken, Henry.....	31	Burditt & Williams.....	93	Davis & Cook.....	70	Harrington, E., Son & Co.....	55&56
Akron Tool Co.....	111	Burgess & Loxley.....	121	Davis, I. B. & Son.....	36	Harrington & King Perforating Co.....	10
Alexander Bros.....	41	Burke, P. F.....	107	Davol, John & Sons.....	2	Harrington & Richardson Arms Co.....	90
Allentown Rolling Mills.....	50	Burnham, Geo. & Co.....	43	Dayton Malleable Iron Co.....	124	Harrison Safety Boiler Wks.....	33
Almond, T. R.....	46	Burr & Houston Co.....	28	Dean Bros. Steam Pump Works.....	40	Hart, Henry C. Mfg. Co.....	90
Am. Axe & Tool Co.....	86	Bussenius & Cunliffe.....	63	Deltz, A. E.....	109	Hart Mfg. Co.....	54
Am. Bolt Co.....	115	Butterfield & Co.....	52	Deming Co.....	72	Hartford Steam Boiler Insp. and Ins.	
Am. Metal Co.....	3	Butts & Ordway.....	66	Detrick & Harvey Machine Co.....	57	Co.....	35
Am. Pig Iron & Storage Warrant Co.....	22	C. & C. Electric Co.....	33	Detroit Dynamo Co.....	33	Hartley & Graham.....	1
Am. Roll Paper Co.....	66	California Wire Works.....	5	Detroit Foundry Equipment Co.....	29	Hartman Mfg. Co.....	9
Am. Screw Co.....	15	Cambria Iron Co.....	21	Diamond Clamp & Flask Co.....	124	Hartwell, E. B.....	90
Am. Spiral Spring Co.....	4	Cambridge Iron & Steel Co.....	26	Diamond State Iron Co.....	106	Hartzell, Geo. W.....	103
Am. Stamping Co.....	94	Cambridge Roofing Co.....	17	Dienelt & Eisenhardt.....	47	Haskell, Wm. H. Co.....	116
Am. Steel Scraper Co.....	111	Canfield, H. O.....	42	Dille & McGuire Mfg. Co.....	114	Hazard Mfg. Co.....	6
Am. Tool Co.....	87	Capital Machine Tool Co.....	72	Disston, Henry & Sons.....	77	Heinisch's R. Sons Co.....	81
Am. Whip Co.....	123	Capitol Mfg. Co.....	109	Dixon, Jos., Crucible Co.....	42	Henderer, A. L.....	47
Agnes Sword Co.....	101	Carbon Steel Co.....	22	Donaldson Iron Co.....	28	Henderson Bros.....	27
Ansonia Brass & Copper Co.....	2	Carlin's Sons, Thomas.....	61	Doscher, Martin.....	81	Hendy Machine Co.....	68
Arcade File Works.....	78	Carpenter, J. M. Tap & Die Co.....	123	Douglas, W. & B.....	72	Hendricks Bros.....	2
Arcade Malleable Iron Co.....	26	Carroll Muzzle Co.....	114	Draper Machine Tool Co.....	61	Hendrick Mfg. Co., Ltd.....	7
Armstrong Mfg. Co.....	48	Cary Mfg. Co.....	79	Dudgeon, Richard.....	50	Hendryx, A. B. Co.....	3
Arnold Metal Wheel Co.....	109	Central Iron & Steel Co.....	32	Durbar Bros.....	5	Henley, M. C.....	92&113
Artificial Gas Engineering Co.....	31	Chadborne & Coldwell Mfg. Co.....	114	Dunham Nut Machine Co.....	56	Henley Machine Tool Works.....	44
Ashcroft Mfg. Co.....	38	Chambers Bros. Co.....	116	Dunlap, C. W.....	94	Herbrand Co.....	25
Atlas Mfg. Co.....	78	Champion Blower & Forge Co.....	52	Durant, W. N.....	37	Henry Mfg. Co., J. T.....	94
Atlas Tack Corporation.....	12	Champion Iron Co.....	9	Dwight Slate Machine Co.....	48	Herrick & Cowell.....	57
Babcock & Wilcox Co.....	39	Champion Mfg. Co.....	113	Eagle Bicycle Mfg. Co.....	123	Herrick, J. A.....	30
Raeder, Adamson & Co.....	70	Chapman Mfg. Co.....	124	Eccles, Richard.....	103	Hertz, T. & Son.....	4
Banker & White.....	78	Chapman Valve Mfg. Co.....	32	Edge Moor Iron Co.....	28	Hiles, C. A. & Co.....	76
Bardsley, J.....	102	Chattillon, John & Sons.....	93	Eicken & Co.....	21	Hillebrand & Wolf.....	51
Barns, C. K. & Co.....	23	Cheney, S. & Son.....	26	Electric Cutlery Co.....	82	Hill, Clarke & Co.....	62
Barnes, W. F. & John.....	46	Chess Bros.....	26	Emory, P. P. Mfg. Co.....	9	Hobson, F., Seaman & Co.....	20
Barnett, G. & H.....	79	Chester Steel Casting Co.....	27	Empire Portable Forge Co.....	102	Hoffman, C. & A.....	80
Barlow Bros.....	71	Christy Knife Co.....	83	Enterprise Mfg. Co. of Pa.....	95	Hoffman, J. W. & Co.....	19
Barnum, E. T.....	9	Chrome Steel Works.....	25	Erie Engine Works.....	38	Hogan, John L. & Co.....	19
Bass Foundry & Machine Works.....	37	Church, Isaac.....	116	Estey, W. S.....	14	Hollands Mfg. Co.....	78
Belden Machine Co.....	46	Church & Sleight.....	37	Ette & Henger Mfg. Co.....	114	Holmes & Edwards Silver Co.....	84
Bell, Geo. E.....	58	Cincinnati Mfg. Co.....	9	Etting, Edw. J.....	19&27	Holt, Hiram & Co.....	112
Bellvue Pump Co.....	73	Cincinnati Milling Mch. Co.....	59	Eureka Cast Steel Co.....	124	Hooker-Colville Steam Pump Co.....	61
Bement, Miles & Co.....	47	Claffen Mfg. Co.....	42	Evans-Friction Cone Co.....	3	Horrocks, Joshua.....	12
Bemis & Call Hardware & Tool Co.....	103	Clapp, Geo. M.....	60	Eynon-Evans Mfg. Co.....	32	Hotchkiss, E. S.....	87
Berger Bros.....	73	Clark, H. P.....	111	F. & N. Mfg. Co.....	113	Houston, C. B. & Co.....	19
Berlin Iron Bridge Co.....	11	Clark & Cowles.....	6	Fairmont Machine Co.....	57	Howard Iron Works.....	108
Bertsch & White.....	44	Clark Mfg. Co.....	83	Fearing, Wm. S.....	2	Howard & Morse.....	7
Best, Fox & Co.....	3	Clendenin Bros.....	14	Ferdinand, L. W. & Co.....	91	Howson & Howson.....	6
Bethlehem Iron Co.....	23	Cleveland Block Co.....	103	Ferracutie Machine Co.....	50	Hubert Bros. & Co.....	123
Bevin Bros. Mfg. Co.....	91	Cleveland City Forge & Iron Co.....	1	Fitch, W. & E. T.....	123	Hunt, Helm & Ferris.....	59
Bickford Drill & Tool Co.....	56	Cleveland Stamping & Tool Co.....	92	Fitchburg Machine Works.....	47	Hunt, Robert W. & Co.....	64
Bicycle Step Ladder Co.....	97	Cleveland Stone Co.....	59	Fitzsimons & Co.....	19	Huyett & Smith Mfg. Co.....	43
Bigelow, C. R.....	62	Cleveland Twist Drill Co.....	54	Flagg, Stanley G. & Co.....	124	Ideal Mfg. Co.....	91
Biggall & Keeler Mfg. Co.....	45	Clinton Wire Cloth Co.....	8	Foley, J. W. & Co.....	53	Illinois Pure Aluminum Co.....	92
Billings & Spencer Co.....	108	Cobb & Drew.....	14	Forehand Arms Co.....	60	Indiana Wire Fence Co.....	4
Bingham, W. Co.....	32	Cockburn Barrow & Machine Co.....	114	Fraim, E. T.....	2&101	Ives, H. B. & Co.....	108
Birmingham Iron Foundry.....	28	Coes, Loring & Co.....	109	Frankford Steel Co.....	21	Jacobus, W. H.....	116
Bissell, E. Son & Co.....	64	Coes Wrench Co.....	109	Franklin, H. H. Mfg. Co.....	63	Jarecki Mfg. Co.....	48
Blake & Johnson.....	14	Coffin & Leighton.....	46	Frasse Co.....	22	Jeffrey Mfg. Co.....	41
Bliss, C. E. W.....	43	Colburn, A. M.....	52	Fray, Jno. S. & Co.....	84	Jenkins Bros.....	1
Boardman, L. & Son.....	61	Colburn Electric Mfg. Co.....	32	Frost Thill Spring Co.....	103	Jenkins & Lingle.....	49
Bogert, John L.....	66	Colby Wringer Co.....	97	Fulton Iron & Engine Works.....	56	Jenner, H. W. T.....	6
Boker, Hermann & Co.....	20	Coldwell Lawn Mower Co.....	113	Fulton Steam Boiler Wks & Foundry.....	43	Jessop, Wm. & Sons.....	20
Boone, W. C. Mfg. Co.....	27	Colliau, Victor.....	31	Gardner, Jas. & Son.....	27	Johns, H. W. Mfg. Co.....	17
Booth, The Lloyd Co.....	28	Conroy, P. J. & Co.....	112	Garrison, A., Foundry Co.....	26	Johnson, I. G. & Co.....	124
Borden & Lovell.....	7	Consolidated Steel & Wire Co.....	16	Garry Iron Roofing Co.....	102	Johnson, I. H., Jr., & Co.....	56
Borgner, Cyrus.....	28	Continental Iron Works.....	37	Gartland Foundry Co.....	27	Johnson, S. C.....	115
Boston Bridge Works.....	17	Copeland & Bacon.....	56	Garvin Machine Co.....	62	Jones, B. M. & Co.....	23
Boston Gear Works.....	38	Corbin, P. & F.....	98	Gautier Steel Department.....	17	Jones, Jesse & Co.....	78
Box, Alfred & Co.....	56	Corning, Edw. & Co.....	18	Gay & Parsons.....	94	Jones & Lamson Machine Co.....	68
Boyce Rivet Co.....	124	Correspondence School of Mechanics.....	123	Gaylord, F. L. Co.....	3	Kayser, Ellison & Co.....	19
Bradlee & Co.....	18	Cotton, Barclay W. & Co.....	18	Gendron Iron Wheel Co.....	90	Keeley, Jerome & Co.....	19
Bradley Fertilizer Co.....	59	Coulter & McKenzie Machine Co.....	48	Gibbs Mfg. Co.....	112	Kennedy, Julian.....	30
Brass Goods Mfg. Co.....	2	Covert Mfg. Co.....	104	Gilbert & Bennett Mfg. Co.....	8	Keuffel & Esser Co.....	73
Bridgeport Chain Co.....	84	Covert's Saddlery Works.....	69	Gleazier Stove Co.....	69	Keyless Lock Co.....	101
Bridgeport De-oxidized Bronze & Metal Co.....	2	Cox, Justice, Jr.....	23	Gleason Tool Co.....	38	Keys, W. W. & R. M. Co.....	3
Bridgeport Gun Implement Co.....	63	Cramp, Wm. & Sons S. & E. B. Co.....	3	Goodell Co.....	82	Keystone Clutch & Machine Works.....	52
Briggs, Marvin.....	62	Creacent Horse Shoe & Iron Co.....	107	Goubert Mfg. Co.....	41	Keystone Mfg. Co.....	71
Bristols' Mfg. Co.....	1	Creacent Phosphorized Metal Co.....	3	Gould & Eberhardt.....	42	Kilbourne & Jacobs Mfg. Co.....	111
Britton, J. Blodgett.....	31	Creacent Steel Co.....	22	Graham, John H. & Co.....	87	Kilmer Mfg. Co.....	7
Broderick & Bascom Rope Co.....	6	Creason, Geo. V. Co.....	51	Grand Crossing Tack Co.....	12	King, J. M. & Co.....	79
Bronson Supply Co.....	93	Cross, G. V.....	97	Grant Corundum Wheel Mfg. Co.....	58	Knapp & Cowles Mfg. Co.....	86
Brown, E. E. & Co.....	108	Cross & Speirs Machine Co.....	3	Green, A. H.....	81	Koch, A. B. & Co.....	80
Brown, H. H. Mfg. Co.....	94	Crown Smelting Co.....	3	Gurney, F. B.....	84	Kohler, F. E. & Co.....	112
Brown Hoisting & Conveying Mch. Co.....	41	Cruikshank, D. B.....	61	Gwinner Mfg. Co.....	73	Konigsfow, Otto.....	102
Brown, R. H. & Co.....	70	Cumberland Nail & Iron Co.....	19	Haight & Clark.....	28	Kreischer, B. & Sons.....	27
Bruce & Marks Mfg. Co.....	111	Cushman Chuck Co.....	62	Haines & Zimmermann.....	91	Krogsrud, W.....	98
Bryden Horse Shoe Co.....	106			Halk & Naumann.....	39	La Belle Steel Co.....	24
Buck Bros.....	81			Halsey, Jas. T.....	52	Lafin & Rand Powder Co.....	26
Buckeye Engine Co.....	37			Halsey, W. S. & Co.....	27	Lake, J. H. & D. Co.....	60
Buckeye Mfg. Co.....	84 & 90					Lane & Bodley Co.....	39
Buffalo Forge Co.....	124					Laue Brothers.....	101
Buffalo Scale Co.....	108					Lange Fence & Wire Co.....	12

Lea, J. Tatnall & Co.....	24	New Britain Hardware Mfg. Co.....	114	R. I. Perkins Horse Shoe Co.....	108	Sun Mfg. Co.....	96
Lean, D. R. Co.....	31	New Castle Wire Nail Co.....	14	Rice, C. F.....	64	Supplee Hardware Co.....	113
Le Count, C. W.....	106	New England Screw Co.....	14	Richardson, C. F. & Son.....	93	Sweett Mfg. Co.....	111
Lee, Jesse & Son.....	86	New Haven Copper Co.....	2	Ridgway, Craig & Son.....	55	Sweetser, W. A.....	41
Leechburg Foundry & Machine Co.....	22	New Haven Mfg. Co.....	61	Riehl Bros. Testing Machine Co.....	32	Swindell, W. & Bros.....	30
Le Massena, C. E. & Co.....	58	New Haven Wire Mfg. Co.....	6	Ripley Mfg. Co.....	95	Syracuse Specialty Mfg. Co.....	112
Leng's, Jno. S. Son & Co.....	124	N. J. Wire Cloth Co.....	8	Riverside Iron Works.....	25	Syracuse Twist Drill Co.....	82
Leonard, B. E.....	109	New Process Twist Drill Co.....	54	Roberts, A. & P. & Co.....	21	Taintor Mfg. Co.....	78
Leonard, J.....	23	Newton & Shipman.....	20	Roberts, Frank C. & Co.....	31	Tablet & Ticket Co.....	60
Leschen, A. & Sons Rope Co.....	6	N. Y. Belting & Packing Co.....	42	Roberts Mfg. Co.....	41	Talcott, W. O.....	42
Levis, Henry & Co.....	23	N. Y. Machinery Depot.....	61	Robinson, J. M. & Co.....	44	Taylor & Boggis Foundry Co.....	30
Lidgerwood Mfg. Co.....	124	N. Y. Mallet & Handle Works.....	80	Robinson-Rea Mfg. Co.....	27	Taylor Iron & Steel Co.....	25
Lilienberg, M. N.....	19	N. Y. Powder Co.....	26	Rogers & Hamilton Co.....	73	Thomson, W. H. & Co.....	19
Lindsay, Jas. G. & Co.....	19	Niagara Stamping & Tool Co.....	48	Rogers, The Wm. Mfg. Co.....	84	Tiebout, W. & J.....	102
Link-Belt Engineering Co.....	46	Nichols Bros.....	83	Rollason Gas Engines.....	38	Titchener, E. H. & Co.....	7
Lockhart Iron & Steel Co.....	24	Nicholson File Co.....	79	Romer & Co.....	102	Tod, Wm. & Co.....	37
Lodge & Shipley Machine Tool Co.....	60	Nicolls, Wheeler & Co.....	18	Rouse, Duryea Cycle Co.....	69	Toledo Bicycle Co.....	91
Long & Allstatter Co.....	41	Niles Tool Works.....	62	Rowland, Wm. & Harvey.....	124	Toledo Block Works.....	103
Lovell, Jno. P. Arms Co.....	91	North Bros. Mfg. Co.....	19	Russell, Burdall & Ward.....	124	Toomey, Frank.....	62
Lovell Mfg. Co., Ltd.....	66	North Bros. Mfg. Co.....	69	Russell & Erwin Mfg. Co.....	100	Torrey, J. R. Razor Co.....	81
Lovell, Tracy & Co.....	107	Northampton Cutlery Co.....	82	Russla Cement Co.....	71	Totten & Hogg Iron and Steel Fdry.	
Lovegrove & Co.....	62	Northampton Emery Wheel Co.....	58	St. Louis Bronze & Aluminum Works	2	Co.....	26
Lucas, C. O. & Co.....	43	Norton Emery Wheel Co.....	58	Sabin Machine Co.....	4	Tower & Lyon.....	88
Ludlow-Saylor Wire Co.....	9	Norton & Jones Machine Tool Works	41	Salem Foundry & Machine Shop.....	52	Townsend, W. P. & Co.....	116
Lufkin Rule Co.....	73	Norwalk Iron Works Co.....	40	Salem Wire Nail Co.....	14	Trenton Iron Co.....	4
Lukens Iron & Steel Co.....	18	Nourse, Fred Co.....	5	Samson Cordage Works.....	1	Threthewey Mfg. Co.....	30
Lundberg, Gustaf.....	20	Nublan Iron Enamel Co.....	35	Samuel, Frank.....	18	Trinmont Mfg. Co.....	108
McCabe, J. J.....	61	Obermayer, S. Co.....	22	Sands, Thomas.....	60	Troy Nickel Works.....	81
McCaffrey File Co.....	78	Ogden & Wallace.....	23	Saunders Sons, D.....	50	Tuck Mfg. Co.....	5
McCallip Fence & Wire Works.....	9	Ohio Lantern Co.....	92	Scattergood, H. W.....	60	Tudor Iron Works.....	1
McClure, Amsler & Co.....	30	Old Dominion Iron & Nail Works Co.	107	Schaeffer & Co.....	112	Tyler Wire Works Co. W. S.....	68
McCoy, Jos. F. & Co.....	76	Olsen, A. B.....	81	Scheeler & Sons.....	6	Underhill, Clinch & Co.....	80
McFarland, Wm.....	4	Osborn, G. Edw. & Co.....	37	Schneider & Trenkamp Co.....	98	Union Hardware Co.....	88
McGowan, J. H. & Co.....	40	Ossawan Mills Co.....	123	Scott, Geo. M.....	41	Union Mfg. Co.....	58
McIlvain, Wm. & Sons.....	31	Ostrander Fire Brick Co.....	27	Scoville Mfg. Co.....	2	Union Metallic Cartridge Co.....	1
McKay, Jas. & Co.....	19	Ostrander, W. R. & Co.....	70	Scranton Forging Co.....	196	Valentine, M. D. & Bro.....	28
McKinney Mfg. Co.....	97	Otto Gas Engine Works.....	33	Scranton Supply & Machine Co.....	61	Valentine Tool Co.....	46
McLean, John.....	37	Oxford Iron & Nail Co.....	14	Seaman, Sleeth & Black.....	26	Valley Pump Works.....	39
McLeod & Henry Co.....	27	Packer, C. W.....	69	Security Warehouse.....	9	Van Dorn Iron Works Co.....	9
McNab & Harlin Mfg. Co.....	37	Palmer & De Mooy.....	27	Sellers, Wm. & Co.....	57	Vanderbilt Sash Balance Co.....	101
Machinists' Supply Co.....	62	Palmer Hardware Mfg. Co.....	70	Seneca Falls Mfg. Co.....	56	Van Wagoner & Williams Co.....	124
Mackey, James T.....	38	Pancoast Henry B. & Co.....	51	Sessions Foundry Co.....	27	Variety Machine Co.....	56
Mahoning Foundry & Machine Shop.....	25	Passaic Rolling Mill Co.....	23	Seyfert's Sons, L. F.....	61	Victor Mfg. Co.....	102
Mahoning Valley Iron Co.....	23	Paxson, J. W. & Co.....	23	Shelby Steel Tube Co.....	30	Vulcan Iron Works.....	26
Main Belting Co.....	42	Peabody & Parks.....	76	Shepard, Sidney & Co.....	72	Waddell, Wooden Ware Works.....	96
Malin & Co.....	79	Peck, A. G. & Co.....	124	Sherwood Mfg. Co.....	41	Wallace Wm. H. & Co.....	23
Mannesmann Tube Co.....	25	Peerless Mfg. Co.....	95	Shilling Foundry Co.....	47	Wardlow, S. & C.....	20
Manning, Maxwell & Moore.....	54	Penna. Diamond Drill & Mfg. Co.....	38	Shipman Engine Co.....	38	Washburn & Moen Mfg. Co.....	4
Manville Machine Co., E. J.....	60	Pennsylvania Mch. Co.....	91	Shoenberger & Co.....	105	Washburn Shops.....	47
Mansfield, H. H.....	62	Perry, W. H. & Co.....	61	Shultz Belting Co.....	1	Waterbury Brass Co.....	2
Maris & Beekley.....	57	Philadelphia Drop Forge Co.....	28	Sibell, Geo. H. & Co.....	62	Waterbury Farrel Foundry & Ma-	
Maslin, J. & Son.....	40	Philadelphia Engineering Wks.....	31	Sibley & Ware.....	59	chine Co.....	40
Mason & Parker.....	80	Phillips, E. & Sons.....	9	Sickels, Sweet & Lyon.....	89&91	Waterbury Machine Co.....	51
Mason Regulator Co.....	123	Phillips, Townsend & Co.....	14	Sidney Steel Scraper Co.....	112	Watson & Stillman.....	50
Mast, Foos & Co.....	73	Phoenix Horseshoe Co.....	106	Sigourney Tool Co.....	49	Wayne, Anthony Mfg. Co.....	93
Matthiessen & Hegeler Zinc Co.....	2	Phoenix Iron Co.....	18	Sills, W. H.....	95	Webster, Warren & Co.....	34
Maurer, H. & Son.....	27	Phoenix Iron Works Co.....	38	"Silver Finish".....	5	Weiland, Chas.....	68
Mayhew, H. H. Co.....	83	Phosphor Bronze Smelting Co.....	3	Silver Mfg. Co.....	107	Wellman Iron & Steel Co.....	18
Merrill Bros.....	19	Pierson & Co.....	22	Simonds Mfg. Co.....	76	Wells Bros. & Co.....	53&59
Merrill Mfg. Co.....	51	Pike Mfg. Co.....	69	Singer, Nimick & Co.....	24	Western Wheel Works.....	91
Merriman, A. H.....	33	Pilling & Crane.....	19	Smith & Egge Mfg. Co.....	93	Wetherell Bros. & Co.....	18&24
Meyers, F. J. Mfg. Co.....	94	Pittsburgh I. & S. Eng. Co.....	31	Smith, H. D. & Co.....	107	Wetherhill, Robt. & Co.....	123
Miles, F. S.....	7	Pittsburgh Mfg. Co.....	47	Smith, J. D. Foundry Supply Co.....	27	White, A. A. & Co.....	66
Miller & Van Winkle.....	4	Pittsburgh Reduction Co.....	68	Smith Friction Drill and Tool Co.....	52	White, L. & J. Co.....	81
Miller Lock Co.....	101	Place, Geo.....	61	Smith, Oliver A.....	113	White Mt. Freezer Co.....	69
Millers Falls Co.....	70&124	Plumb, Fayette R.....	85	Smythe, S. R. Co., Inc.....	30	Whitlock Coil Pipe Co.....	35
Milne, A. & Co.....	21	Plume & Atwood Mfg. Co.....	2	Snell Mfg. Co.....	83	Whitney, A. R. & Co.....	25
Milton Mfg. Co.....	114	Plymouth Mills.....	7	Sommer's Son, John.....	124	Whitton, A. & Sons.....	23
Miner & Peck Mfg. Co.....	48	Pollock, W. B. & Co.....	37	Southwark Foundry & Machine Co.....	38	Whitton, D. E. Mch. Co.....	52
Mohr, J. J.....	19	Pollock, W. B. & Son Co.....	39	Speldel, J. G.....	57	Wickwire Bros.....	7
Monroe, S. G.....	97	Pope Mfg. Co.....	69	Speirs, J. C. & Co.....	26	Wilcox & Howe Co.....	108
Montour Iron & Steel Co.....	23	Popping, J.....	60	Spencer's I. S. Sons.....	28	Wiley & Russell Mfg. Co.....	51&124
Moore, Dr. Gideon E.....	68	Port Chester Bolt & Nut Co.....	115	Springfield Brass Co.....	40	Williams, J. H. & Co.....	108
Moore Mfg. & Foundry Co.....	56	Porter, H. K.....	115	Standard Axe & Tool Co.....	84	Williamson, C. T. Wire Nov. Co.....	123
Moore & White Co.....	52	Pottstown Iron Co.....	21	Standard Fibre Ware Co.....	93	Williamsport Wire Rope Co.....	6
Moorhead-McCleane Co.....	24	Pottsville Iron & Steel Co.....	18	Standard Fdry. & Mfg. Co.....	31	Wilmot & Hobbs Mfg. Co.....	1&124
Morgan Construction Co.....	4	Powell Planer Co.....	47	Standard Horse Shoe Co.....	106	Wilson, E. H. & Co.....	19
Morgan Spring Co.....	4	Pratt & Whitney Co.....	53	Standard Steel Casting Co.....	124	Wilson, John.....	80
Morrison, Robert.....	38	Prentiss, Geo. W. & Co.....	6	Standard Tool Co.....	64	Wilson, J. Fred.....	116
Merse Twist Drill & Machine Co.....	54	Prentiss Tool & Supply Co.....	61	Standard Tool Co.....	71	Willson, W. A.....	47
Morse, Williams & Co.....	67	Prentiss Vise Co.....	72	Stanley Rule & Level Co.....	123	Winslow, Sm'l. Skate Mfg. Co.....	89
Morton, Thos.....	97	Pullman, J. Wesley.....	24	Stanley Works.....	69	Wister, Francis.....	22
Moseley Iron Bridge & Roof Co.....	6	Pullman Sash Balance Co.....	102	Stark Mch. & Tool Co.....	49	Wister, L. R. & Co.....	23
Mount Carmel Bolt Co.....	123	Quint, A. D.....	48	Starrett, L. S.....	75	Witherow, Jas. P. Co.....	29
Myers, F. E. & Bro.....	72	Rainey, W. J.....	1	Steam Gauge & Lantern Co.....	93	Wolcott & West.....	66
National Horse Nail Co.....	107	Rand Drill Co.....	39	Stearns, E. C. & Co.....	98	Wolff, C. H.....	101
National Machinery Co.....	40	Randolph & Clowes.....	1	Stechert, G. E.....	68	Wolff, R. H. & Co. Ltd.....	5
National Pipe Bending Co.....	36	Read, Wm. & Sons.....	123	Steel & Iron Improvement Co.....	68	Wollensak, J. F.....	71, 95&103
National Saw Co.....	76	Reading Hardware Co.....	99	Steptoe, J. & Co.....	63	Wood Alan & Co.....	19
National Screw & Tack Co.....	12	Reece, Edw. F.....	62	Sterling Emery Wheel Co.....	58	Wood, R. D. & Co.....	28
Naylor & Co.....	23	Reeves, Paul S.....	124	Sternbergh, J. H. & Son.....	115	Wood, W. Dewees Co.....	24
Neff, W. H.....	96	Reeves Pulley Co.....	66	Stevens Arms & Tool Co.....	87	Woodward & Rogers.....	45
Newark Machine Tool Works.....	68	Reilly, J. W.....	19	Stiles & Parker Press Co.....	43	Wooster, F. V.....	101
		Reliance Wire Wks Co.....	8	Stocking, E. B.....	6	Worcester Mch. Screw Co.....	116
		Reynolds & Co.....	13	Storm Mfg. Co.....	72	Worthington, Henry R.....	40
				Stover Mfg. Co.....	94	Wright & Colton Wire Cloth Co.....	8
				Stow Flexible Shaft Co.....	54	Wright, Peter & Son.....	76
				Stow Mfg. Co.....	54	Wrought Iron Bridge Co.....	16
				Sturtevant, B. F. Co.....	47	Wurster, F. W. & Co.....	124
						Wyman & Gordon.....	28
						Yale & Towne Mfg. Co.....	56&71
						Zucker & Levett Chem. Co.....	33

Hopkins & Allen Mfg. Co.'s

SINGLE BARREL SHOT GUN

12, 16 AND 20 GAUGE.

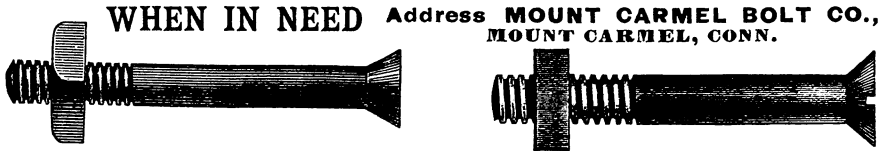
Perfect workmanship. Thoroughly guaranteed. A popular gun at a popular price.

Packed in pasteboard boxes for hardware trade. Comes apart without the aid of tools.

Send for Circular and New Prices.

HULBERT BROS. & CO.,

26 WEST 23d ST., NEW YORK.



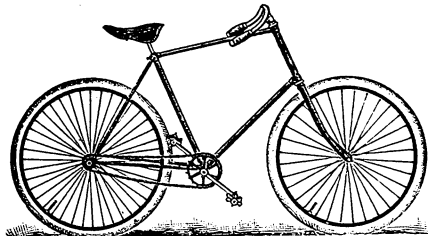
WHEN IN NEED Address **MOUNT CARMEL BOLT CO.,**
MOUNT CARMEL, CONN.

DIRECTIONS FOR USING
WILLIAMSON'S NEW POWER CORK SCREWS.
KEEP ON TURNING, DO NOT PULL.

No. 1243, Nickel Plated, Apple Wood Handle, \$5.00 per dozen.
1443, Rosewood 5.50

For Discounts and Prices of other styles send for Catalogue.
C. T. WILLIAMSON WIRE NOVELTY CO., NEWARK, N. J.
Manufacturers of Wire Specialties for the Trade.

PRICE ISSUES OF 1894 WILL BE MET.

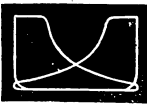


EAGLE ALUMINUM RIMS (Patented).
A 24 lb. Guaranteed Road Wheel.
Highest Grade. Correct Design.

Special ADVANCE Proposition
FOR THE
Hardware Trade.

Samples (only) '94 Lines Ready for Delivery.
New Lines, New Features, New Patterns.

OUR SIXTH YEAR.
THE EAGLE BICYCLE MFG. CO.,
Makers of Highest Grade Bicycles, Torrington, Ct.



MAKE YOURSELF A Mechanical Engineer or Draughtsman; or qualify to take charge of, or to superintend the manufacture of machinery by devoting your idle hours to Home Study by the method of **THE CORRESPONDENCE SCHOOL OF MECHANICS**, Scranton, Pa. To begin, students need only know how to read and write. Moderate Charges. Send for **FREE Circular**.

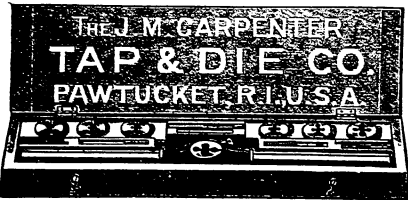
EXPERIMENTAL ELECTRICITY.

By **EDWARD THEVERT.**

Illustrated. - Cloth. - \$1.00.

CONTENTS—Some Easy Experiments in Electricity and Magnetism; How to Make Electric Batteries; A Galvanometer; An Induction Coil; An Electric Bell; A Magneto Machine; A Telegraph Instrument; An Electric Motor; A Dynamo; Electric Bell Fitting and Gas Lighting; Electric Lamps; Electric Terms.

DAVID WILLIAMS, Publisher & Bookseller,
96-102 Reade St., New York.



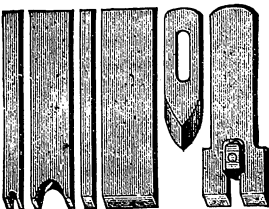
CROWN and GIANT BRAIDED
Sash Cords, Bell Cords, Mason's Lines, Clothes Lines, Bright Wire Goods, Picture Wire Nails, Kacobs and Hooks Brass Chain, Spool Wire, Etc.

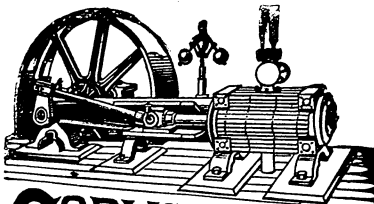
OSSAWAN MILLS CO.,
Norwich, Conn., U. S. A.

STANLEY'S ADJUSTABLE
Beading, Rabbet, Slitting and Matching Plane.

No. 45. Iron Stock and Fence, with Eighteen Tools, Bits, etc., \$8.00

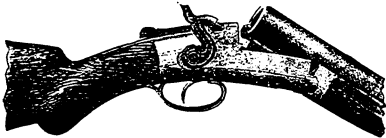
Sold by all Hardware Dealers.





CORLISS ENGINES
MACHINISTS
IRON FOUNDERS, BOILER MAKERS,
ROBT. WETHERILL & CO.
CHESTER, PA.

GUNS



AGENTS FOR THE

Forehand & Wadsworth
SINGLE GUN
TOP SNAP ACTION.

Best Gun made. Sold very largely by the Hardware Trade.

Special prices to the trade. Also all grades Double Guns.

WM. READ & SONS,
107 WASHINGTON ST., **BOSTON, Mass.**
ESTABLISHED 1826.

AMERICAN WHIPS

If you sell whips send for price on 10 Americans, our special assortment for hardware dealers. A complete line in one lot.

AMERICAN WHIP CO.,
WESTFIELD, MASS.

For Electric Elevators.

A new device for throwing on and off the switch which is used in electric elevators, and operated by the increase or decrease in the water pressure, is manufactured by the Mason Regulator Co. of Boston. It has already been used to some extent quite successfully on electric elevator plants.

THE W. & E. T. FITCH CO.,
NEW HAVEN, CONN.
Manufacturers of a variety of
HARNES SNAPS.



This Cut represents the
UNION PAT. BOLT SNAP.

PAUL S. REEVES,

Philadelphia.

Phosphor Bronze

AND

BABBITT METALS.

Lead Lined Car Bearings a Specialty.

Brass and Phosphor Bronze Castings from $\frac{1}{4}$ pound to 20,000 pounds in weight.

STANDARD STEEL CASTING CO.
THURLOW, PA.
STEEL CASTINGS
QUALITY EQUAL TO STEEL FORGINGS

BURGESS & LOXLEY,

Malleable Iron and Small Steel Castings.

MILITARY ROAD & CHANDLER STREET,
BUFFALO, N. Y.

NORWAY IRON RIVETS.

FOR ALL PURPOSES.

WRITE FOR PRICES TO

THE BOYCE RIVET CO.
MUNCIE, INDIANA.

New Full Mounted
Lightning Screw
Plate.
Send for Catalogue



WILEY & RUSSELL MFG. CO., - Greenfield, Mass.

STEEL TUBES

WELDLESS

JOHN S. LENG'S SON & CO., NEW YORK.

DAYTON
MALLEABLE
IRON CO.
DAYTON, O.
HIGH CLASS
CASTINGS A SPECIALTY.

BUFFALO
BLOWERS
FOR CUPOLAS, FORGES,
FURNACES & EXHAUSTERS
STEAM FANS, HEATERS &
VENTILATING WHEELS
NOISELESS
BUFFALO FORGE CO.
BUFFALO, N.Y.

STANLEY G. FLAGG & CO., Philadelphia, Pa.
Office and Works, N. W. Cor. 19th St & Pennsylvania Ave.
Manufacturers of **STEEL CASTINGS**,
A Substitute for Steel and Wrought Forgings.
Circulars Sent on Application.

FILE HANDLES.

See Page 70.

MILLERS FALLS CO.

93 Reade St., New York.

SPRINGS AND AXLES
ROLLING MILL
F. W. WURSTER & CO.
375 Kent Ave. Brooklyn N.Y.

ESTABLISHED

Spring Making, 1842. Steel Making, 1845.
Norway Iron, 1871 (Re-Rolled).

WM. & HARVEY ROWLAND,

MANUFACTURERS OF

Springs, Steel, Re-Rolled Norway
Iron & Slit Norway Nail Rods.

Address FRANKFORD P. O., PHILADELPHIA.



A. G. PECK & CO.
Cohoes, N. Y.

MANUFACTURERS OF

AXES, ADZES
BROAD AXES
HATCHETS.

Send for Catalogue and
Price List.

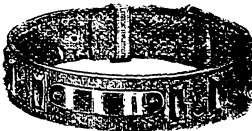
LIDGERWOOD HOISTING ENGINES.

300 styles and sizes. Over 9500 in use.

LIDGERWOOD MFG. CO., 96 Liberty St., N. Y.

DOG COLLARS,
DOG MUZZLES.

THE
CHAPMAN
MFG. CO.,
Meriden, Conn.



JOHN SOMMER'S "PEERLESS" FAUCETS
BEST
BLOCK TIN KEY.
WITH
LEATHER
LINED
MAPLE WOOD BODY
HIGHLY POLISHED
ONLY THE GENUINE ARE STAMPED
IN THE WOOD
WITH TRADE MARK
AS PER CUT
BEWARE OF IMITATIONS
FAUCETS SIMILAR IN SHAPE
SUCH AS
JOHN SOMMER'S SON, MFR., 8-12 PEARL ST., NEWARK, N.J.

THE DIAMOND
BRASS DOWEL PIN AND
WOOD FILLET.
THE D. C. & F. CO.
BIRMINGHAM, U.S.A.

RUSSELL, BURDSALL & WARD,
Portchester, N. Y.,
Manufacturers of

Carriage, Tire, Plow and Stove

BOLTS

Carriage Bolts made from Best Square Iron a
Specialty.

EUREKA CAST STEEL COMPANY.

Office and Works, Chester, Pa.

Open Hearth, Crucible and Eureka Steel Castings.
Railroad and Machine Castings.

Locomotive Cross-Heads and Gearing a Specialty.
Guaranteed Knuckles for M. C. B. Couplers.

Solid Steel Castings

From Crucible and Open Hearth.

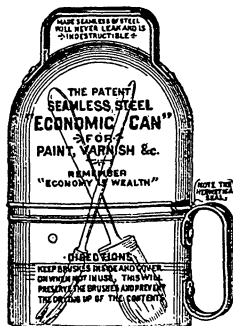
Steel and Gun Metal Rolls
Specialties.

Air Furnace Refined
Malleable Castings.

ISAAC C. JOHNSON & CO.,

ESTABLISHED 1853,

SPUYTEN DUYVIL, NEW YORK CITY.



THE "ALWAYS READY"
"ECONOMIC" CAN.

For Paint, Varnish,
Shellac, &c.

The hermetical seal
preserves the
brushes and contents.
No more Dry or Hard
Brushes.

No more Paint Skins
and Drying up of
Contents.

This can commends
itself at once to Paint-
ers, Pattern and Cab-
inet Makers, and all
who use fine Paints,
Varnish, Shellac, etc.

THE WILMOT & HOBBS MFG. COMPANY,
20 Murray St., NEW YORK.

GEM SPRING HINGES

		JAPANNED.	
FOR DOORS,		Length of Flanges.	Single Acting.
Feet.	Inch.		
6x2	$\frac{3}{4}$ to $1\frac{1}{2}$	3 $\frac{1}{2}$ in	63
7x2	1 to $1\frac{3}{4}$	4 in	64
7x2 $\frac{1}{2}$	1 to $1\frac{3}{4}$	5 in	65
7x2 $\frac{1}{2}$	1 to $1\frac{3}{4}$	6 in	66
8x2 $\frac{1}{2}$	$1\frac{1}{4}$ to $1\frac{3}{4}$	7 in	67
8x3	$1\frac{1}{2}$ to $2\frac{1}{4}$	8 in	68
9x3	$1\frac{3}{4}$ to $2\frac{1}{2}$	10 in	69

FOR SCREEN, MEDIUM AND HEAVY DOORS.

Single and Double Acting.

THE $3\frac{1}{2}$ AND 4 INCH
ARE THE BEST IN
THE MARKET FOR
SCREEN DOORS.



Send for full Catalogue of Bronzed, Brass and
Bronze Metal Spring Hinges.

MANUFACTURED BY

VAN WAGONER & WILLIAMS CO.
CLEVELAND, O. and 14 WARREN ST., N. Y.

THE IRON AGE

THURSDAY, NOVEMBER 2, 1893.

The Norwalk Double Compound Air Compressor.

We have the privilege on this and the following pages to present in perspective and vertical section engravings showing the main features of the 28 x 30 inch double compound air compressor built by the Norwalk Iron Works Company of South Norwalk, Conn.

Steps Leading to Present Construction.

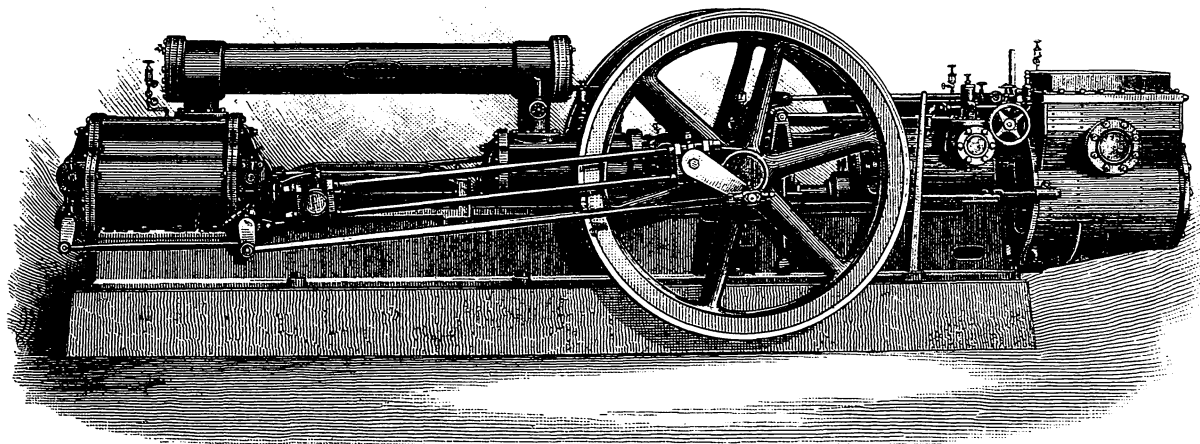
Before describing the compound air compressor as at present designed, it may be of interest to briefly outline the various steps through which the machine passed before reaching its present development, confining this matter to the compressor as developed by the company above referred to. In their

inders, which consisted of a large pipe or reservoir filled with thin brass water pipes. The air in its passage to the second cylinder becomes divided into thin streams by the water pipes and thus each particle is brought into contact with a cold surface and its temperature rapidly reduced. This was found, as will be explained further on, to produce economic results of a degree unlooked for. The reason for its introduction and the reason for its maintenance at the present time may be briefly stated. The compression which takes place in the initial cylinder heats the air, which if allowed to pass directly to the compression cylinder would fill that cylinder with gas at a certain temperature and certain volume. It is evident that by reducing the temperature the volume of air that would be introduced in the second cylinder would thereby be increased and the capacity of the machine correspondingly augmented.

room secured a saving of about 1 per cent. for every 5° lower temperature obtained.

The Corliss valve for admission of air having proved to be such an important improvement, its use was still further extended in the next pattern, and it was applied as a discharge valve on the intake air cylinder, as illustrated in Fig. 2.

The amount of compression which is performed in the intake air cylinder is always uniform, for the reason that the pressure produced here is simply the pressure required to compress the air into the smaller or compressing cylinder. Hence there being a uniform discharge pressure for this cylinder it is a simple matter to adjust a mechanically moving discharge valve to open at the exact and proper point of discharge. This arrangement has proved to be highly gratifying and has been adopted for all these standard compressors.



THE NORWALK DOUBLE COMPOUND AIR COMPRESSOR.

compound air compressor as built in 1880, a compressing air cylinder was placed between the steam and the intake air cylinders. The air valves were of the poppet variety, of the most improved construction and very liberal in area. Both air compressors were provided with water jackets. The air was taken into the large cylinder, where it was partly compressed and from which it was conducted by a large pipe to the smaller compressing cylinder, where it was compressed to the desired pressure. These cylinders were similar, although, of course, the operation was reversed, to the cylinders of a compound steam engine, the low pressure cylinder being the intake and the high pressure the compression cylinder. The objects aimed at in this construction, were: 1. To make the resistance of the air to compression an average resistance throughout the stroke, instead of the excessive and maximum resistance at end of the stroke, which is obtained in all single compressors. 2. To reduce the losses of clearance spaces to the smallest amount by having the pressure in the intake cylinder a light pressure. 3. To have the advantages of two water jackets and more time for cooling the air.

The next change was the addition of an intercooler between the two air cyl-

Another important change made shortly afterward was the doing away with the poppet inlet valve and the introduction of one inlet valve of the Corliss steam engine pattern placed in each head of the intake cylinder. This improvement did away with much trouble caused by the little poppet valves and, furthermore, had the advantage of insuring a full supply of air at every stroke. The valves were opened and shut by a connection with the main engine shaft and no vacuum or pressure in the air cylinder was needed to insure their proper working.

The next change, while retaining the Corliss valve, was in the valve connections, which were made more direct by employing a wrought iron return crank attached to the main crank pin. This pattern also had removable air hoods which connected the inlet valves with the cold air conduit beneath the floor, through which cold air from outside the engine room was led to the compressor. This was introduced for the reason that it is far preferable to obtain air as cold as possible and also as free from dust particles and vapor as possible, the pure cold air not only adding to the economy of the machine, but also increasing its durability. Tests showed that this method of obtaining air from outside rather than from the engine

Although the next change involved no alteration in the general features of the machine it covered important points in the details where experience had shown that changes might be made conducing to the better working of the compressor or for other advantages to the user. An automatic pressure regulator of new and patented design was attached to the steam cylinder. Lubricators of new design were also placed on the air cylinders having sight feed and fine adjustment.

The next change of importance was in the valve gear. In the usual patterns of the standard Norwalk compressor air pressure in the inlet cylinder at the period referred to was about 25 pounds. This pressure was so light that its effect on the wearing of the Corliss valve had been regarded as of little consequence, but the demand having been made for compressors for pressures to thousands of pounds to the square inch made it expedient to use higher pressure in the inlet cylinder. The valves were, therefore, moved by cams, the shape of which was such that the valve remained at rest until the pressure below it had become nearly equal to that above it. Then the movement commenced and the valve was quickly thrown wide open. In closing, the cam allowed a rapid movement, so that the valve be-

came seated before any considerable pressure came upon it. The connection which threw it shut was elastic, so that if a valve seat became dry no cutting occurred. This form of movement having such desirable features for heavy pressure was considered to be in a degree useful on any pressure, and was therefore adopted for the standard compressors.

Description of Compressor as Built Now.

Ordinary poppet valves were considered to have serious objections when used for inlet valves. They are closed by springs, and to insure prompt closing at all speeds, especially when the valve stems became foul with dust and gummy oil, the springs must have quite a little strength. Springs exerting a force of less than 8 ounces per square inch of valve surface are too weak. The slight throttling of the inlet by these springs, although scarcely to be seen on indicator cards of the usual scale and taken in the ordinary way, causes loss amounting to 3.41 per cent. in capacity at the sea level, while at higher altitudes it is greater. These and other considerations led to the adoption and retention of the well-known Corliss valves, which have a positive movement from the main shaft. With these the port is large, is clear of obstructions and opens directly into the cylinder. Indicator cards when running at 250 revolutions and at piston speeds up to 500 feet a minute have been taken of these compressors. With ordinary indicator springs no vacuum is discernible, but with an extremely light spring of only 4 pounds to the inch the slightest indication of a difference of pressure within and without the cylinder can be detected.

The process of compression has two interesting features—viz, the increasing resistance to the advance of the piston and the increasing temperature of the air due to the compression. A steam engine is usually the source of power. In the steam cylinder the pressure is greatest at the beginning of the stroke and least at the end, while in the air cylinder the direct reverse is the case. To equalize in some measure this vast difference between power and resistance has been the task presented to the ingenuity of mechanics. The most common method of overcoming this difference has been in the employment of heavy fly wheels and extra strong connections. We quote from a pamphlet on these compressors, from which most of the particulars here presented are taken, which has just been issued by the Norwalk Company.

"To obtain nearly uniform resistance the air cylinder should be conical, large at one end and small at the other. Of necessity this would be single acting, and the piston should be capable of expanding and contracting to fill the bore of the cylinder at any point. In such a cylinder at the first of the stroke, when the piston is large, it would encounter a light pressure, but at the last of the stroke, when the pressure is very great, the piston would be small and the engine would be able to overcome the resistance with ease. A machine constructed in this manner is in the present state of the art an impossibility. Its result is, however, very closely imitated in the Norwalk compound air compressor, in which a large cylinder is employed to make the initial air pressure, while a small cylinder is used to effect the final and heavier compression. The air is forced from the larger cylinder into the smaller, and in the smaller

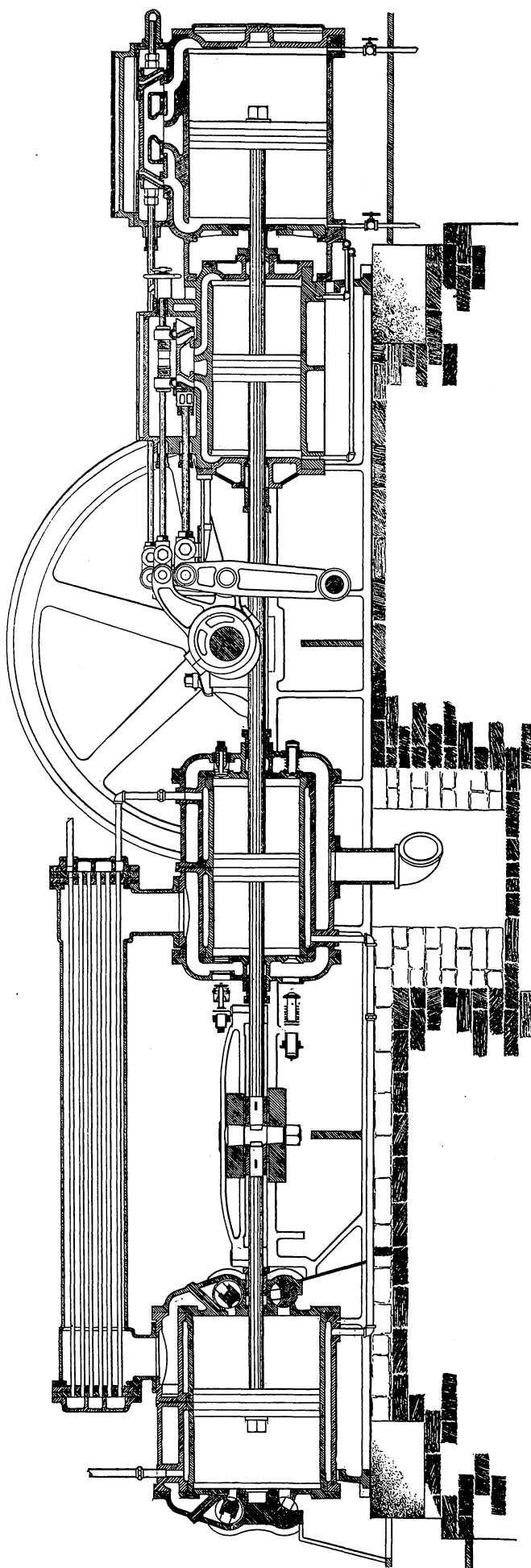


Fig. 2.—Vertical Longitudinal Section through all the Cylinders.

THE NORWALK DOUBLE COMPOUND AIR COMPRESSOR.

cylinder is compressed to the extent desired. By such an arrangement much of the resistance is transferred from the end to the beginning of the stroke, and a more nearly uniform resistance for the whole stroke is obtained."

A large air cylinder, that on the left in Fig. 2, determines the capacity of the compressor. Assuming this to have a sectional area of 100 square inches, the small air cylinder would have an area of $33\frac{1}{3}$ square inches. The small piston only encounters the heaviest pressure and at 100 pounds pressure the resistance to its advance would be 3333 pounds. The resistance against the large piston is its area multiplied by the pressure which is caused by forcing the air from the large cylinder into the smaller cylinder. In this case it is 30 pounds per square inch, but as this pressure acts on the back of the small piston and hence assists the machine, the net resistance of forcing the air from the large into the small cylinder is equal to the difference of the area of the two pistons multiplied by the 30 pounds pressure. This is $66\frac{2}{3}$ by 30 and equals 2000 pounds. The resistance to forcing the air from the larger into the smaller cylinder, plus 3333 pounds, the resistance in the smaller cylinder to compressing it to 100 pounds, is the sum of all the resistance in the compound cylinders at the time of the greatest effort and is 5333 pounds. The time of the greatest effort is at the end of the stroke or when the engine is passing the center. It is stated that in the single machine this resistance has been seen to be 10,000 pounds and hence in the compound machine the maximum strains are less by over 46 per cent. or nearly one-half. By thus reducing the work to be done at the end of the stroke, more work is done in the first part of the stroke and the resistance is made nearly uniform for the whole stroke.

The next step is to render the application of power also uniform for the whole stroke. This is accomplished in a very simple and effective manner. The steam and air pistons and cross head are mounted on the same piston rod. These parts have considerable weight, so that it requires most of the power of the steam over and above the air resistance at the beginning of the stroke to start them forward at the required speed. At the end of the stroke, when the steam has become weak by expansion, the power stored up in the momentum of these reciprocating parts is given out in useful work, and the parts are brought to a state of rest by expending their force upon the air in compressing cylinders. As the energy which can thus be stored and given out by the reciprocating parts depends upon their weight and the square of the number of revolutions, it is evident that rotative speed is the most important factor. Hence very long strokes are not desirable, because at the same piston speed the machines make fewer revolutions than machines of shorter strokes. Therefore, the power is not applied to the work so uniformly, and greater strains are brought on shafts, connecting rods and other parts, while larger fly wheels and frequently double engines are necessary for successful operation, especially where steam is to be used expansively.

The uniform resistance and uniform power both applied, as in this compressor, and direct end thrust and pull through a straight steel piston rod, do not leave much work for fly wheels to perform. Their presence is necessary, however, to regulate the steam valve motions, to control the length of stroke,

to even up and balance trifling inequalities of power and resistance, and to secure a uniform speed to the machine.

No water is allowed in the cylinders in contact with the air and all cooling is effected by surface coolers. This intercooler is shown connecting the two air cylinders above which it is placed. The advantages of surface cooling in comparison with the use of water in the air cylinders are stated to be several. The first consideration is that the product of compression with surface cooling is dry air. This is a matter of much importance. When the air is heated by compression and brought in contact with water it becomes saturated with moisture. Air when exhausted after doing work has a temperature far below zero. So low a temperature quickly freezes up all moisture in the air and deposits it as ice in the exhaust passages of the air engine, which in a short time are choked up or entirely closed. The remedy for these evils is to keep the air dry.

The value of cooling attachments is that they effect a direct saving of the power required for compression, and by keeping the parts cool make it possible to obtain thorough lubrication. Air compressed to five atmospheres, or 60 pounds pressure on the ordinary gauge, in a compressor without cooling arrangements, would be raised in temperature from 62° to 373° F. Assume that the amount of air is such that it requires an engine of 100 horsepower to do the work. If now a perfect cooling apparatus be added to the compressor, the power required would be reduced from 100 down to $78\frac{1}{3}$ horsepower. Or in other words the value of a perfect cooling apparatus to that compressor would be $21\frac{1}{3}$ horsepower. So much cooling cannot be obtained from a single cylinder jacket for the reasons already cited.

In the compound compressor doing the same work the temperature of the air on leaving the first cylinder would be 199° , if the cylinder had no jacket. All this heat above the atmospheric temperature can be taken out in the intercooler. By thus cooling the air the original 100 horsepower required will be reduced to $88\frac{1}{3}$ horsepower. We have seen that by perfect cooling another gain of $9\frac{1}{3}$ horsepower is possible. For this a water jacket is put on each of the two air cylinders, which return a useful effect of $4\frac{5}{8}$ horsepower. It is, therefore, concluded that in a 100 horsepower compressor when compressing to 60 pounds it is possible to gain $21\frac{1}{3}$ horsepower by perfect cooling.

The steam engine attached to these standard compressors is designed to attain the highest economy, the one shown in the engraving being of the tandem compound type. The steam cut off valves have a wide range and are quick in their action, giving a clear sharp point of cut off and a very perfect expansion line. The cut off is changed by turning a hand wheel placed at the back end of the high pressure steam chest and it is easily accessible. The point of cut off can be changed while the machine is in motion to meet any requirements of speed. Its position is shown by an index. The general arrangement of the steam cylinders, their valves and the connections with the eccentrics, which are placed on the shaft which carries at each end a fly wheel, are clearly brought out in the sectional drawing.

The experience gained in building a large number of machines by this company, and careful investigations with the

indicator, have resulted in the production of an engine particularly well adapted for this duty.

Launch of the Battle Ship "Oregon."

The United States battle ship "Oregon" was successfully launched from the yard of the Union Iron Works, at San Francisco, Cal., on Thursday, October 26, in the presence of an immense crowd of people, including some of the most prominent representatives of the States of Oregon and California. The "Oregon" is one of the three ships the bids for which were opened at the Navy Department, on October 1, 1890. These ships are technically known as armed coast line battle ships of the first class. The two sisters of the "Oregon" are the "Massachusetts" and "Indiana," both of which have been constructed at the yard of the Cramps, in Philadelphia. By a provision of the act of Congress authorizing their construction it was directed that one of the three vessels should be built on the Pacific coast, and the contract was awarded to the Union Iron Works, at San Francisco. The appropriation for each ship was \$4,000,000, exclusive of armament. The "Oregon" is similar in all respects to her sister vessels, and is of great fighting power, with adequate protection in strength of armor. Her length on the water line is 348 feet, extreme breadth $69\frac{1}{2}$ feet, and draft 24 feet, the latter feature being designed to enable her the better to navigate the shallow waters of the American coast. Her displacement will be 10,200 tons, her maximum speed 16.2 knots, and sustained sea speed 15 knots. The vessel has a powerful ram bow.

The armor of the ship lies in a water line belt, which rises 3 feet above the water and extends to a depth of $4\frac{1}{2}$ feet below the water. This armor belt consists of 18 inches of the most improved type of modern armor. Rising from this water line belt at each end are armored redoubts of 17 inches in thickness. These redoubts extend above the main deck $3\frac{1}{2}$ feet, and give an armored freeboard of 15 feet 2 inches. These redoubts protect the turning gear of the turrets and all the operations of loading. The turrets are designed to be inclined. They are 17 inches thick and are powerfully strengthened. The horizontal thickness of the inclined turrets is 20 inches. The side armor belt of the "Oregon" is backed by 6 inches of wood, two $\frac{3}{4}$ -inch plates and a 10-foot belt of coal. Above the water line armor belt the "Oregon" has 5 inches of armor protection.

The battery of the "Oregon" will consist of four 13-inch breech loading rifles; 20 6-pounder rapid fire guns; 6 1-pounder rapid fire guns; two Gatlings, and six torpedo tubes; constituting a weight of armament equal to that of any modern battle ship of the foreign powers. The engines of the ship are of the twin screw, vertical, triple expansion, inverted cylinder type, placed in water tight compartments and separated by bulkheads. The diameters of the cylinders are: High pressure, $34\frac{1}{2}$ inches; intermediate, 48 inches, and low pressure 75 inches, with a 42-inch stroke. There are four double ended and two single ended auxiliary steel boilers of the horizontal return fire tube type. The main boilers will be about 15 feet outside diameter and 18 feet long. The auxiliary single ended boilers will be about 10 feet 2 inches in diameter and $8\frac{1}{2}$ feet long.

Single Boiler Punching Machine.

The accompanying engraving represents a machine intended for general punching on boiler work, but which is particularly arranged for punching close in the corner of flanges, the punching tools moving out to the extremity of the lower jaw when such work is being done. The machine illustrated has capacity to punch a 2-inch hole through $1\frac{1}{2}$ inch metal, or a $4\frac{1}{2}$ -inch hand hole through $\frac{3}{4}$ inch metal, and is shown with throat 50 inches deep, which will punch to the center of 100-inch plates. The

and loose pulleys are furnished for driving by belt. The makers are the Long & Allstatter Company of Hamilton, Ohio.

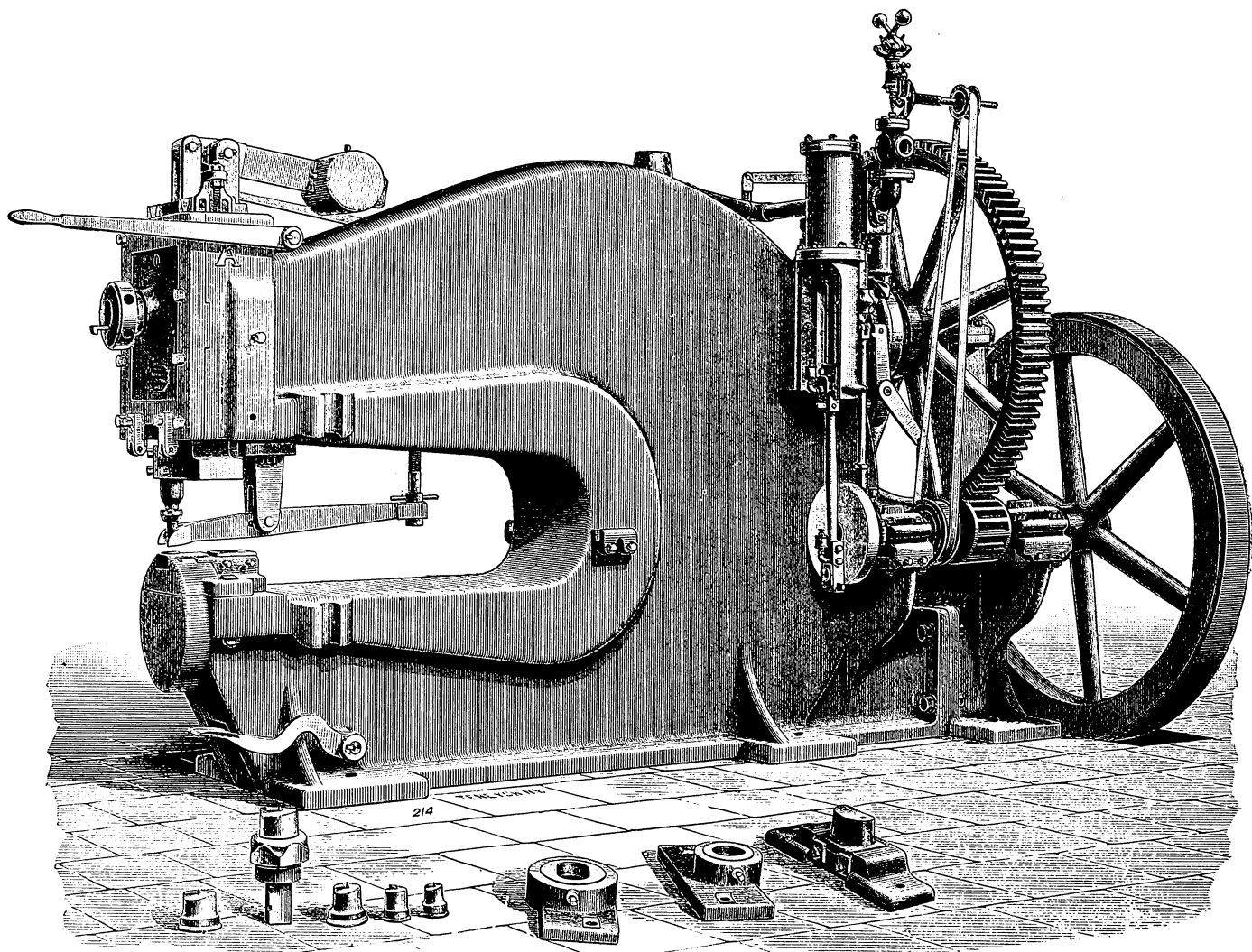
The Riedler Compressor.

L. de Thurrimont has reported in the *Génie Civil* the results of the coal consumption trials of the Riedler air compressors at Paris. The plant consists of four triple expansion Corliss engines of 2000 horse power each, with 20 Babcock & Wilcox boilers, furnished with Green's economizers, the whole made by Schneider & Co. of Creusot. The

ments subsequently. The results of the trials showed, for a total indicated horse-power of 1996, a consumption of 1.29 pounds per indicated horse-power per hour.

Other experiments, made in December, 1891, on the efficiency of the machinery, to determine the ratio between the indicated work done by the air pistons and the indicated work in the steam cylinders, showed a ratio of 0.8997. The engines had then only been in use a few days.

A device recently introduced by an Ohio trolley road is calculated to pre-



SINGLE BOILER PUNCHING MACHINE.

throat is made various depths, from 12 to 60 inches.

The tools shown attached to the machine are for punching rivet holes; these tools are easily and quickly removed and others attached for punching hand holes, flue holes, &c.; shears, either cross cut or splitting, can also be used. Flue and hand hole tools are shown lying on the floor.

The machine is driven by a heavy steel cam shaft, and a hand wheel is provided in front for setting the tools. An automatic stop is provided which brings the slide to rest at completion of the stroke. The attached steam engine, with governor, makes the machine self contained and independent of belting and shafting. When desired, tight

specification prescribed as a maximum for coal consumption on trial, 1.54 pounds per indicated horse-power per hour, the fuel being Anzin briquettes. The trial was to last eight hours, the speed to be 60 revolutions per minute, the steam pressure on the high pressure pistons about 150 pounds per square inch, and the compressed air pressure 114 pounds per square inch. A deduction was to be made from the total consumption for condensation in the steam pipes. The eight hours' trial was divided into 16 periods, and diagrams taken simultaneously from the three cylinders in the middle of each period. The condensation in the steam pipes was ascertained by special experi-

vent collisions between electric cars and railroad trains. The appliance consists in a safety switch for railroad crossings, which is so constructed that an electric car cannot pass a railroad track until the conductor or motorman has first crossed the track and set the switch. The idea is to compel the conductor to precede the car to the track, and so make a collision almost an impossibility.

Crowds of unemployed workmen are said to be flocking to San Francisco on the chance of getting work on the mid-winter fair. The city has already more unemployed of her own than she can care for.

The Sague Galvanizing Machine.

Samuel A. Sague, vice-president of the Britton Iron & Steel Company of Cleveland, has invented a galvanizing machine which is in operation at the mill in question. The machine galvanizes 3000 sheets per turn of ten hours at a labor cost of \$6.30 per day, the force being two men and a boy. In the ordinary dipping pot process the daily product is 800 to 1000 sheets at a labor cost of \$10.25 for a crew of seven men and one boy. There is also some saving in acid and a lessened consumption of spelter.

The object of Mr. Sague's invention is to substitute continuous galvanizing for the ordinary process, which is described as follows:

The sheets or plates, as received from the rolling mills, in all cases, are first

immersed in what is called a "pickling bath" which is composed of sulphuric acid heated in any suitable manner, the object of thus pickling the sheets or plates being to clean the same—that is, to remove scales and dirt that may be adhering to the surface of the sheets or plates. The action of the sulphuric acid, however, produces a spongy and irregular surface, the original smooth surface of the sheets or plates being destroyed. After pickling, the sheets or plates are washed in a tank of water; thence taken and laid upon a table and scraped by hand. Workmen, by means of hand scrapers, remove dirt and scales that still adhere to the sheets or plates. The work last referred to is not only necessarily slow and laborious, but it is almost impossible to thus satisfactorily remove all impurities and foreign substances from the surface of the sheets.

Next the surfaces of the sheets or plates are prepared for the zinc or spelter coating by immersing the sheets or plates in a tank supplied with muriatic acid, resulting in the formation of a flux upon the surfaces of the sheets or plates to enable the zinc or spelter to adhere thereto more closely and serving also to still further and more thoroughly clean the sheets or plates. The sheets or plates undergoing treatment must be thoroughly cleaned preparatory to their immersion in the zinc or spelter bath. From the muriatic acid bath the sheets or plates are loaded on an iron car and conveyed to a kiln, where the sheets or plates are thoroughly dried. When dried the sheets or plates are ready for the zinc or spelter bath. This loading and unloading of the sheets or plates and their transportation to and from the kiln also requires much labor and time. The sheets or plates are next, with a longitudinal edge lowermost and in batches, immersed or dipped in the zinc or spelter bath. A tank or pot, as it is technically called,

sheets or plates from the bath causes the spelter to adhere to the sheets or plates unevenly and in patches, resulting in a waste of zinc or spelter, which is the more costly metal. Since the sheets or plates are placed in the tank lengthwise on edge, in withdrawing the same from the bath the molten metal coating of the sheets or plates necessarily gravitates to the lowermost longitudinal edges of the sheets or plates, resulting in an objectionable increase in thickness in the coating along these edges. After being coated with zinc or spelter the sheets or plates are wiped by hand, usually by means of canvas. The sheets or plates are lastly run singly through calendering rolls, for the purpose of straightening and smoothing them and putting them in good condition for shipment.

The continuous process which Mr. Sague uses in his machine pursues a

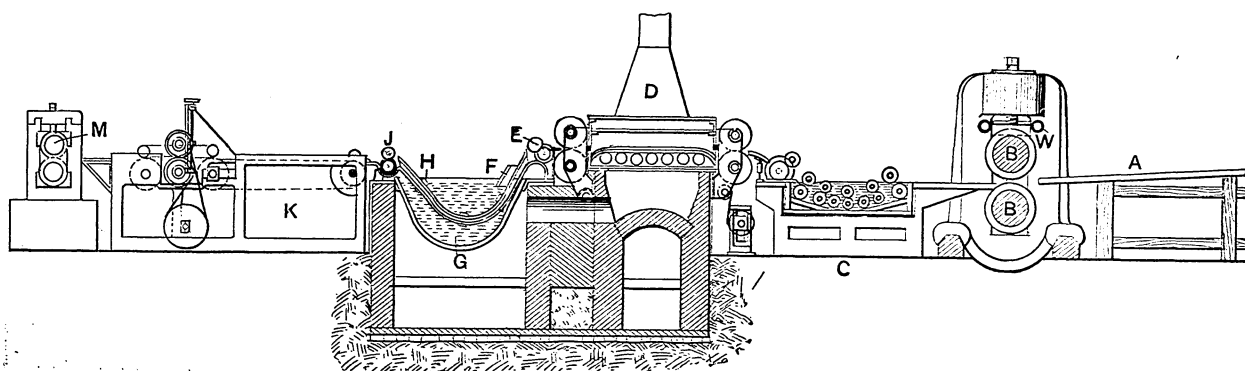


Fig. 1.—Elevation.

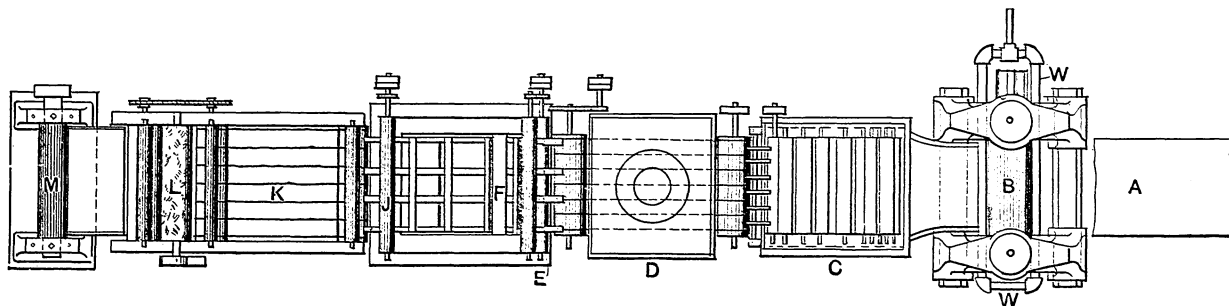


Fig. 2.—Plan.

THE SAGUE SHEET GALVANIZING MACHINE.

is filled with melted spelter or zinc, which is kept liquid by coke fires constantly burning around the tank or pot, the zinc or spelter bath being protected in any suitable manner to prevent oxidation of the molten metal, and sal ammoniac or a suitable flux being employed to give the coated sheet or plate a brighter appearance. Workmen handle the sheets or plates by means of tongs. The treatment of the sheets or plates by the means just described is not only objectionable in that it is exceedingly slow and laborious, but the sheets or plates are not coated with uniformity. Some sheets or plates remain in the bath longer than others, and consequently the coating of the different sheets or plates of a bath varies in thickness. Then again, in withdrawing the sheets or plates from the bath it is impossible, by the means just described, to withdraw them at a uniform speed, and the sheets or plates are very liable to be jerked. This irregularity in the withdrawal of the

more rational course. The accompanying engraving shows the apparatus designed. Mr. Sague pickles the sheet of iron or steel as heretofore and places it upon a table, A, at one end of the apparatus. From table A the sheet is fed to cold rolls, B, located in the required proximity to the delivering end of the table A and being of any suitable construction. Table A declines somewhat toward rolls B to facilitate the feeding of the sheet, water being discharged upon the rolls by means of the perforated pipe W to keep them clean. The effect of powerful cold rolling under water, after pickling the sheet or plate, is pronounced of vast importance by Mr. Sague, not only entirely removing the irregularities in the surfaces of the sheet, which irregularities are the result of the action of the pickling acid, but rendering the surfaces of the sheet or plate beautifully smooth and crushing and washing away all impurities and foreign substances. Rolls B deliver the sheet to the muriatic acid coating vat C. At the receiving end and ex-

At the receiving end and ex-

tending transversely of vat C are located a pair of suitable rolls adapted to receive the sheet from the rolls B, and the sides of the vat afford bearing for the trunnions of a series of guide rolls. At the delivering end of vat C are located suitable wringer or wiper rolls. The sheet is thus fed endwise through the muriatic acid bath between the upper and lower guide rolls to wringer or wiper rolls, whence the sheet or plate is fed between rolls to and through the drying chamber of a furnace, D. A pair of rolls is provided at the delivering end of the drying chamber of the furnace, from which the sheet passes to guide rolls E and is thence conducted through a suitable flux in box F into and through the zinc or spelter in the so-called "galvanizing" pot G. The sheet or plate is guided in its passage through the spelter bath by a pair of curved and parallel open frames, H.

Rolls, J, carry the sheet on to endless chains, K, that lead it to the brushing machine L, where the sheet is brushed clean. It is then fed to calendaring rolls, M, that are adapted to smooth and finish the sheet or plate, and deliver it in proper condition for shipment.

The products of combustion from the furnace which is used to melt the zinc are conducted under the drying chamber, in order to utilize the waste heat.

WORLD'S FAIR NOTES.

Maris & Beckley

of Philadelphia exhibit at Column O 30 a hand traveling crane and Teal's portable hoists. The crane is mounted on a light frame of angle iron, which serves very well to show its special features. The hoists are shown in a variety of sizes, adapted to a wide range of work. The firm are manufacturers of power as well as hand traveling cranes.

The Andrews & Johnson Company

of 241 to 247 South Jefferson street, Chicago, have an interesting exhibit of ventilating apparatus at Column M 31. They manufacture not only fans and blowers, but also the Johnson high speed engine, adapted especially for direct connection to these devices, although it can be used for other purposes. It is a double piston engine, the pistons being placed opposite each other on the crank shaft. The pistons and valve gear are inclosed so that the bearings run in oil and water. It has a somewhat singular appearance, with its horizontal projections on each side of the crank shaft, but it runs noiselessly, maintains a very high speed, is economical in the use of steam and is said to be capable of long service, provision being made for taking up wear. The exhaust is used to furnish warm water for the center bearings. A large number of disk fans are constantly in operation in this exhibit, showing many ways of applying them, as for instance in the ceiling, in the wall, in the side of a shaft and on the floor.

Hawley Down Draft Furnace Company

of Security Building, Chicago, at Column H 25, make a joint exhibit with John Mohr & Son, boiler manufacturers, whose works are at 32 to 42 Illinois street, Chicago, and Ninety-sixth street and Calumet river, South Chicago. A well finished flue boiler is shown, with

brick work complete, except for a small portion of one side of the fire box, which permits an inspection of the method of fitting the Hawley smokeless furnace to the boiler. This furnace has an upper and lower fire chamber. The upper fire chamber, into which coal is shoveled, has grate bars of pipes inclined upward to the rear. These pipes are connected with the boiler to secure a circulation of water, which they assist in heating. The lower fire chamber is fitted with ordinary grate bars, and is connected under the boiler with the chimney. Partly consumed coal drops from the upper fire chamber to the lower, which soon becomes so hot that it burns all gases drawn downward from the fresh coal above, and thus prevents the formation of smoke by securing more perfect combustion than if the coal was burned by direct draft.

The H. C. Frick Coke Company

of Pittsburgh, Pa., make one of the most attractive and instructive exhibits in the east gallery of the Mines and Mining Building to be found at the exposition. It is, perhaps, as perfect a representation as can be made of the business of manufacturing coke aside from the actual work itself. In the foreground of the exhibit is a complete model of the coke ovens, hoisting works, engine house, &c., of the company's Standard mine. It is built on a large scale, and shows the network of railroad tracks running through the yards, with miniature cars standing on them, while the long double row of ovens looks remarkably true to life, with a gas jet at the top of each as though the ovens were being fired. A row of workmen's houses stands in the vicinity of the ovens. Fine coke has been strewn over the ground, giving it the natural appearance of coke yards. This model is built on a platform the sides of which are furnished with glass doors inclosing samples of large pieces of coke. In the rear of this splendid piece of work is a model of the Leisenring No. 2 shaft, with its double hoist in operation. It includes all the buildings, engine house, &c., which were built by the Keystone Bridge Company of Pittsburgh. The model is one-sixteenth of the actual size of the plant, and was made by the Jones Bros. Electric Company of Cincinnati. It is a piece of exquisite work. To the right of this model stands a huge pyramid of coke, 18 feet square at the base and extending to the roof of the gallery. It is built of large pieces of coke, and has on one side a tablet giving the daily capacity of Frick coke at 21,000 tons. Next comes a 34 bushel mine car built by Kenney & Co. of Scottdale, Pa., which is filled with "run of mine" Connellsville coal, and stands on a short piece of mine track. Beyond this is a long table on which is a train of five cars, perfect models of standard coke cars for the transportation of coke. They are filled with coke, and so faithfully are details carried out that each has on it a shipping tag. They stand on a complete track. Numerous photographic views of mine buildings are shown in frames revolving on a pedestal having a base of coke inclosed in glass. A large relief map is shown of the entire Connellsville region, giving the location of every mine and faithfully reproducing all the natural features. It is on a scale of 1200 feet to the inch, a horizontal scale of $\frac{1}{14400}$ of nature and a vertical scale of $\frac{1}{28800}$ of nature. It was modeled by Edward B. Harden of Philadelphia from the surveys of the H. C. Frick

Coke Company, J. H. Paddock being chief engineer and Kenneth Allen engineer in charge. On the walls hang a large topographical map of the region on a scale of 1600 feet, a plan of the underground workings of the Leisenring mine, &c. The company distribute as a souvenir a beautifully printed pamphlet, with photogravure illustrations, entitled, "Connellsville Coke." It gives a history of the development of the coke industry of the Connellsville region and shows the magnitude of the interests now involved.

The Rand Drill Company,

23 Park Place, New York, and 1327 Monadnock Building, Chicago, have two exhibits of a high order. One of these is located in Machinery Hall, in the engine section, and the other in the Mines Building, on the east side near the southeast entrance. The exhibit in Machinery Hall consists of a large compressor of a new and greatly improved type, having a number of interesting features. It is of the duplex pattern, and has a capacity of 2500 cubic feet of air per minute. It is provided with a compound condensing Corliss engine having an automatic pressure regulator to the cut off, and has compound air cylinders with an intermediate cooler between the cylinders, through which the air passes to become cooled by water preparatory to the second compression in the high pressure cylinders. The air cylinders are fitted with mechanical valves, which obviate the fluttering and chattering of the valves upon their seats and thereby give a full and unobstructed passage for the air both into and out of the air cylinder. The steam cylinders are 22 and 40 by 48 inches, while the air cylinders are 22 and 34 by 48. The engine is about 350 horsepower, and the machine is constantly at work under steam, supplying air to a system of piping through the fair grounds for use in operating air brakes, moving locomotives and hoisting elevators, thus supplying power in numerous locations where steam is not allowed or not available. It has done most excellent service during the entire term of the Fair, having proved itself to be thoroughly reliable, efficient and economical.

The exhibit in the Mines Building is of a more varied character, comprising air compressors, rock drills and other mining appliances. The air compressors shown here are of several classes. One is a 14 x 22-inch duplex, Class B. This is a standard machine, and is fitted with mechanical valves also. It represents a type of air compressors made by this company which will be found in world wide use. It is in regular operation, furnishing air to run the drills exhibited. Other compressors are the straight line 16 x 24, 12 x 16 and 8 x 12 Class C machines, a duplex 12 x 16 belt compressor and a 7 x 9 belt machine for pneumatic tube work in class D and a powerful three-stage vertical high pressure machine capable of compressing air or gases to 4000 pounds to the square inch. The drills comprise the Slugger, Little Giant, Kid and Acrobat rock drills and a blast furnace tapping drill. The Kid is a small drill for lightest work. The blast furnace tapping drill is one of the company's latest machines, and saves the labor of a large force of men in tapping a furnace. Among the notable mining appliances are Derby hollow drill bits, through which exhaust air is forced down to the face of the cutter, and the powdered stone is thus blown out of the hole as fast as it is cut,

which increases the cutting capacity of the bit by keeping a clean rock surface under the cutting tool. Various styles of tripods are shown, also drifting or tunnel columns, shaft and stoping bars, quarry bars, &c. A model is shown in a glass case of the first rock drill invented, in which the steel bit was made the extension of the piston rod. It was invented by J. W. Towle of Boston, in 1851, and covers the chief points in use to-day. There are few exhibits more attractive to miners than the fine display made by this company, whose compressors and drills are known all over the world wherever mining operations are conducted on a scale involving the use of machinery. The company's achievements have been recognized by the bestowal of ten awards, covering the large compressor in Machinery Hall, and the compressors, drills, furnace tapping drill, shaft bar, columns and Derby bit, as well as a separate award on the collective exhibit of compressors and drills in the Mines Building. The Chicago office of this company is under the direct charge of J. F. Lewis, than whom very few men are better known to or more highly esteemed by the mining fraternity.

Lidgerwood Mfg. Company

of New York and Chicago make an exhibit of hoisting machinery at Column F 28, Machinery Hall. Six different styles of engines are shown and two styles of mining hoists. One of the latter is a 50 horse-power friction drum reversible engine and the other is a 20 horse-power reversible engine. Among the engines is a 30 horse-power six spool erecting engine for use in bridge and large building erections. There is also a double friction drum 20 horse power contractors' hoist, with boiler complete. The others comprise a 12 horse power single friction down hoisting engine, and a 30 horse-power Locke-Miller cable way engine used in operating the Locke-Miller cable way, for open pit mining, canal excavation, dam building, &c. In the Electricity Building the company also show a 110 horse power mining hoist, run by a Thomson-Houston motor. The smallness of the space allotted prevented the company from exhibiting log skidding and stone quarry engines, rapid unloaders, &c. They manufacture in all 300 sizes and styles, but those exhibited are selected as fairly representative of their machines.

Fraser & Chalmers

of Chicago and London have a large exhibit of mining machinery in the Mines Building, in the southeast corner. One of the most interesting features of this exhibit is a huge Chilean mill, which consists of a pair of large rolls about 7½ feet in diameter and weighing 8½ tons each, moving at a speed of 14 revolutions per minute. These rolls revolve in a huge pan, not only turning on their own axis, but revolving in opposite directions. They grind 18 tons of rock to 160 mesh, or 24 tons to 80 mesh in 24 hours. Other appliances shown are a complete water jacketed lead furnace and improved stone breaker, Eckart's fine crushing rolls, Standard, Blake and Dodge crushers, a prospector's hoist, with a mining cage rigged and in full operation, the Bridgman sampling machine, revolving screens, a moving belt with small samples of perforated metal completely covering it, a retort and bullion furnace, grinder for preparing assay samples, a sectional mortar for muleback transportation, double discharge dry

and wet crushing mortars, the Huntington roller quartz mill, improved frue vanners, a modern five-stamp quartz mill, making 90 drops per minute, with wearing parts of ferro-alumina, and one of the famous Riedler mining pumps, now used in so many deep mines. All this machinery is in order for operation, so that its action can be shown to those interested. The same firm have a 1000 horse-power Corliss quadruple expansion engine in active service in Machinery Hall.

The P. H. & F. M. Root Company

of Connersville, Ind., make a good display of pumping, blowing, ventilating and exhausting apparatus in the Mines Building. A peculiarity of this exhibit is that the same principle runs throughout their blowers, pumps and exhausting apparatus. Two revolving parts are inclosed in the body of the machine, so constructed that they keep up continuous contact with each other and with the case in which they are inclosed during their entire revolution, thus forcing forward and utilizing all the air or water taken into the case. The firm also make a water motor on the same plan. The principle is simple, but ingenious, and appears to be remarkably effective. A belt pump is shown, constructed in this way, having a capacity of 3850 gallons per minute. It is connected with a tank, from which it draws a supply and into which it discharges. This pump is meeting with special favor for irrigation purposes. One of them, at Grand Junction, Col., runs with an 87-inch turbine, the largest size made, and hoists water 180 feet high. It has a 24-inch nozzle and discharges 4000 gallons per minute. A positive high pressure blower is shown, with engine attached, which is capable of sustaining a pressure of 12 pounds to the square inch. Samples are exhibited of the new Acme portable forge for light, general and heavy smith work.

Fairbanks, Morse & Co.

of Lake and La Salle streets, Chicago, exhibit steam pumps and hoisting machinery in the Mines Building. Six pumps, a pump and receiver and two styles of hoisting engines are shown. All are duplex pumps. The largest is a compound 8 x 12 x 12 inches. These pumps are manufactured by the firm in Beloit, Wis. The pumps shown are therefore of the firm's own patterns. They have been made for only a year, but are meeting with great success. They range from water works pumps down to small boiler feeders. Most of those exhibited are shown connected and in working order. The hoists have been made for several years. One shown is double and the other single. These hoists are in wide use in the mines of the West, and the specimens shown are of the general type.

Webster, Camp & Lane Machine Company

of Akron, Ohio, make an excellent exhibit in the Mines Building, which gives a fair idea of the company's products. They show a portable hoist with boiler complete, as well as a steel frame work to support the sheave for the rope. A miners' cage is in position, a hole having been cut in the floor to receive it. A double tail rope haulage engine is shown, having two drums. This is set up as if for regular work, the platform in the center between the cylinders being equipped with the levers, but it is not in operation. There is also a Corliss engine neatly mounted on

foundations, so as to show its proportions and finish, but it is not connected for work.

The Ingersoll-Sergeant Drill Company,

Havemeyer Building, New York, and 100 West Washington street, Chicago, have two exhibits. The exhibit in Machinery Hall consists of one of their latest improved compound duplex piston inlet cold air compressors. The principal features of this compressor consist in the manner of receiving the free air into the cylinder through a tube (which acts also as a piston rod), creating a uniform draft of air in one direction only, this uniform movement giving a certain momentum to the air and causing it to fill the cylinder to its fullest extent at each end of the stroke. The air inlet valves are large metallic rings which open and close by the natural momentum caused by the movement of the piston, admitting of a large area of inlet, with but a small throw of the valve. The cooling is effected by means of a new form of water jacket, the construction of the air cylinder admitting of an unusually large cooling surface being presented to the compressed air, near the end of the stroke, when the air is hottest. Another important feature is the new unloading device, maintaining a uniform pressure in the receiver and a uniform speed of the engine by means of connections with a discharge valve on each end of the air cylinder, a weighted valve of the safety valve pattern connected with the receiver, and a balanced throttle valve in the steam pipe. This compressor is driven by a compound Corliss condensing engine of a little over 300 horse power. The high pressure steam cylinder is 18 x 42 inches and the low pressure cylinder 34 x 42, while the air cylinders are 18½ x 42. This compressor has been in constant use during the fair, furnishing power to exhibitors in the Transportation Building who could not use steam.

The exhibit of this company in the Mines Building consists of compressors, drills and quarrying and coal cutting machinery. A straight line compressor is operated for the purpose of furnishing power to the other machines. The bar channeler on exhibition, for quarry work, will drill a round hole or cut a smooth open channel and takes out every cubic foot of stone in a marketable shape without blasting. Fourteen hundred feet of channel per month has been cut with this machine, and it is feasible to make cuts to a depth of 10 feet. The Ingersoll steam channeler, the Ingersoll standard gadder and the Ingersoll-Sergeant quarry bar are also shown. The Sergeant drill is in operation and presents many new features; also their standard mining drill, mounted on column for drifting or general tunnel work. The coal mining machine made by this company is peculiarly adapted to mining small veins of coal. Being simple and light it may be used in any place where a miner can swing a pick, and is extensively used by the leading coal miners in this country. The Sergeant air head has proved a great attraction to mining men. By means of a cup leather in this head a piston packing is secured, replacing the glands and packing usually applied to rock drills. Their Crescent battery is a positive and reliable blasting machine and discharges a uniform current of electricity, not depending on the skill of the operator; requires no violence or rapid movement when making the blast; is not liable to break or get out of order, and is very

simple in construction. The Moran flexible steam joint is also shown. By using a combination of these joints iron pipe may be used to conduct steam or air to drills instead of hose. Awards were made both on the compressor shown in Machinery Hall and on the machines exhibited in the Mines Building. The Chicago agency of this company is with Parker, Melcher & Ingraham, Incorporated, 100 West Washington street.

Gates Iron Works

of Chicago exhibit in operation in the Mines Building one of their great rock breakers of the next to the largest size made. Its capacity is 150 tons per hour, breaking rock from 14 x 30 inches down to 2½ inches. They also show stone screening machinery in operation, for sizing stone for macadam roads. A large sized working model is shown of a macadam crushing plant, automatic throughout, for crushing, elevating, screening and distributing stone in bins. A set of Cornish rolls, a dry ore concentrator and an amalgamator are exhibited. The company manufacture a general line of mining machinery, but were not able to show as much as they desired, on account of the limited space allotted them.

James Leffel & Co.

of Springfield, Ohio, make an interesting exhibit of their turbine wheels in the Mines Building. Large ones are shown, indicating the sizes which are manufactured by the firm, while smaller ones are exhibited, beautifully finished in brass, with all parts complete. In connection with the turbines is shown a specimen of Leffel's small steam engines. It is set on the back of a return flue boiler, to which it is rigidly fastened ready for the usual belt connections. Thus the only floor space required is for the boiler.

R. McCully

of 1518 Spring Garden street, Philadelphia, exhibits the McCully rock and ore crusher in the Mines Building. This is a gyratory crusher, which has its shaft and crusher head supported and adjusted from the top of the machine. It also has a marble bottom for detaching the shaft operating mechanism without dismantling the entire machine. A very large output is claimed for this machine with a comparatively small expenditure of power.

The Connersville Blower Company

of Connersville, Ind., exhibit in the Mines Building one of their cycloidal blowers, the invention of their engineer, John T. Wilkin. This blower is driven by a direct engine, and develops a positive pressure of very great force for the size of the machine shown. It is a rotary blower, of which the internal operating parts consist of two impellers shaped accurately on cycloidal lines. The box in which they are inclosed is internally in the form of an ellipse. The cycloidal impellers perfectly fit in the ends of the ellipse and in the corresponding parts of each other, so that there is no leakage of air but a positive pressure forward of the full supply entering the chamber. Gas exhausters, pumps, motors, &c., are to be built on this principle.

The MacKay Electric Reciprocating Tool Company

of 733 Exchange Building, Boston, exhibit in the Mines Building a full sized specimen of one of their electric drills, while a handsomely finished model of

small size is shown at practical work drilling in rock. The company manufacture a full line of reciprocating tools operated by electricity for cutting, drilling, molding and carving all kinds of stone and for riveting and calking boilers and ships.

E. Moreau

exhibits in the Mines Building one of the Sterling-Moreau hand rock drills. These drills are intended to take the place of hammer and drill in ordinary mining. They are mounted on a tripod and operated by a double crank, so that a workman can use both hands or two men can work the machine and secure more power. It is a percussion drill with a pair of hammers, cam shaft and reciprocating springs. One size of machine only is built. It is claimed that with it one man can do as much work as three with hammers and drills in the usual way. The drill is shown in actual operation on hard rock. It will shortly be manufactured in Philadelphia, arrangements now being under way.

Borden & Selleck Company,

48 and 50 Lake street, Chicago, show in the Mines Building the Harrison soft coal conveyor, consisting of triangular vertical heater attached to an endless chain, working in a V-shaped trough. They also exhibit a double strand wrought chain bucket elevator, a single strand wrought chain bucket elevator, a Harrison conveyor and shaking screen, and a coal and slack scraper for yards and mines. The company are large manufacturers of conveyors for all classes of materials.

Nelsonville Foundry & Machine Company

of Nelsonville, Ohio, exhibit in operation a double tail rope haulage engine. The cylinders are 11 x 16 inches, are geared six to one and drive 5-foot drums holding 2½ miles of rope. The engine has a steam friction clutch and is reversible. The drums are independent, and one can be reversed without regard to the other. It is a very compact engine, and takes up remarkably little floor space. The cylinders are so placed as to bring the drums inside the front and back lines of the engine.

James H. Lancaster

of New York exhibits in the Mines Building a rock and ore crusher, breaking rocks from 13 x 8 to 2 inches, with a capacity of 7 tons per hour. This crusher has corrugated jaws. The motion is applied to the rocking jaw by a double cam, which works with hardly any friction and gives the precise movement needed.

S. J. Meeker

of Newark, N. J., makes a very interesting exhibit in the Mines Building of malleable and gray iron castings, from car couplers down to small parts of harness. The large samples are shown on the floor, while the smaller ones are fastened to show boards placed on the wall.

Cookson Mfg. Company

of Kansas City, Mo., exhibit in operation in the Mines Building, pumping very muddy water, the Cookson duplex steam pump. Its size is 14 x 10 x 10 inches, and it delivers a solid 6-inch stream of water. This pump has the Lewis rotary valve in both steam and water cylinders, rigidly connected on the same stem. There are no poppet or check valves, the movement of the valve being independent of the water pressure.

The ports open gradually to the full capacity of the water cylinder and close in the same way. The pump is not only adapted to raising pure liquids, but is specially adapted to pumping sewage, muddy water, water soaked grain or other very heavy duty.

Sullivan Machinery Company

of Claremont, N. H., exhibit in the Mines Building a great variety of coal and stone cutting machinery. They also show a number of diamond core drills, capable of doing very heavy work. This exhibit is very comprehensive, taking in not only large steam drills but small hand drills for prospectors' use, capable of boring 300 feet.

The New Jersey Steel & Iron Company

of Trenton, N. J., exhibit in the northwest section of the annex to Transportation Building a revolving model of the center panel of the 356 foot 6-inch double track span of the Chicago, Burlington & Quincy Railroad bridge across the Mississippi River at Burlington, Iowa. The model is some 6 feet square and 8 feet high, constructed of small beams, channels, angles and tie rods, riveted and connected precisely like the bridge itself. It is mounted on a revolving table of the kind used for swinging bridges. A circular railing incloses this specimen of a bridge, and on it are hung samples of trace and other chains made by the company. On a display board at the side are tacked specimens of chains of numerous sizes and kinds, as well as sections of the beams and channels made by the company. On another part of the space is shown a model to one-fifth size of the superstructure of the Brooklyn Elevated Railroad. A full-sized section is shown of the top chords of four 440-foot double track spans of the St. L., K. & N. W. bridge now being erected over the Missouri River at Bellefontaine Bluff, Mo. Immediately adjoining this exhibit is that of

The Trenton Iron Company

of Trenton, N. J., whose display is largely of wire rope, even the ornamental railing in front being formed of such rope, arranged in decorative patterns. Two pyramids formed of coils of wire rope, properly braced, are used as posts to support a rope tramway, on which is shown a patent cable hoist carriage having a carrying capacity of 1 ton. There is also shown a 20-ton block for a cable hoist, of the kind used at Glen Union, Pa., where an extensive rope tramway system is in regular use. Nearby is a new patent dump car composed wholly of iron and steel, known as the Weber dumping car. It has a capacity of 2800 pounds, hangs on pivots, and is emptied by a crank at the end, which works in cogs, carrying the car just off the center, when it dumps out the entire load sideways. Some of the cars and part of the track system of the Bleichert overhead tramway are also exhibited here. A number of nicely arranged showboards give specimens of hoisting rope, Tiller, Lang, Lay and standard galvanized and transmission rope, patent locked wire rope in smooth coil, interlocking and locked wire hoisting rope, patent tramway couplings and lugs, patent tramway parts, such as anchorages, bolt sockets, &c., specimens of reduction in rolling from a 4-inch billet to No. 4½ rod and 1 inch flat, reduction in drawing wire by the different stages from ¼ inch to No. 44, wire specialties in tempered cast

steel, such as spiral coil and flat springs, coils of coppered iron wire, tinned iron wire, galvanized spiral ribbon, and telegraph wire. Tests are shown of the comparative strength of iron and steel wires, by weights suspended from a beam by a specimen of each kind of wire. A reel of patent locked wire rope is shown, 3400 feet long and $1\frac{1}{2}$ inches in diameter, which has been in continuous service day and night for 24 months hoisting loads of $6\frac{1}{2}$ tons at a speed of 3000 feet per minute at the Central Copper Mine. It is in such condition that it will be put in service again immediately after the close of the exposition. Showcases contain samples of fine wires, such as are used for all kinds of musical instruments, book stitching, broom, bottling, tempered cast steel card wire and weaving wire. A coil of bright iron wire, No. 50, is shown weighing $11\frac{1}{2}$ pounds, which measures over 3 miles in length. Two whip-like pieces are shown which are specimens of reduction in drawing wire from $\frac{3}{8}$ rod to No. 36 wire, the intermediate reduction being shown in lengths of about 1 inch. An Acme patent tramway car is also shown, which is intended for use on overhead tramways, but also has wheels at the bottom to facilitate handling on the ground. It is made of iron and steel, holds half a ton and the bottom drops automatically.

The Trenton Iron Company have another exhibit which attracts a very great deal of attention in the shape of a completely equipped wire rope tramway operated on quite a large scale. It is located in the open air, running from the southwestern corner of the Mines Building to the Sixty-fourth street entrance to the grounds. It is used for transferring diamondiferous earth from the store yard on the grounds to the Mines Building, in which it passes to the crushers in the South African diamond exhibit. This tramway is built on the Bleichert system. As operated here it works backward, bringing material in toward the operating station instead of taking it out as usual, but works just as well under such conditions. This tramway has a total length of about 1000 feet and the ropes are supported on iron posts of lattice work. The posts are 15 to 20 feet high except at one place in passing over the intramural elevated railway, where they are about 40 feet high. Motive power is supplied to this plant by electricity. During the whole period of the fair there has been a constant stream of buckets passing back and forth over this tramway, automatically weighing and unloading themselves. The practical value of the system has thus been demonstrated in a much more effective way than by any other possible method. Inside of the Mines Building, under the floor, is shown a system of underground haulage by the same company. A passageway has been constructed which runs from one side of the building to the other. It resembles in every respect a passageway in a mine. The company's special styles of mine cars are shown, drawn by a steam tall rope Lidgerwood engine. At one place, under Fraser & Chalmers' exhibit, a mining cage comes down through the floor of the building to this railway. The company deserve and have received a great deal of credit for their enterprise in making such a complete exhibit of their products and devices.

F. C. Austin Mfg. Company

of Carpenter street and Carroll avenue, Chicago, exhibit a number of road

making machines and other road and street devices in the northwest corner of the annex to the Transportation Building. The New Era grader and ditcher is the principal feature of the exhibit. It is intended to be drawn by a traction engine, but when that is not available 12 horses will be used. It can handle from 800 to 1000 cubic yards per day, which brings the cost of grading very low. One of them is now being used on the Chicago drainage canal, handling loose rock, with good results. It is, however, best adapted to making concrete roads. One will build 30 miles per day of good roads. It delivers the earth from 14 to 22 feet from the plow and at an extreme height of 8 feet. The Austin rock crusher, for macadam and stone roads, is a portable crusher that can be put in position at any desired location and run by a portable engine or other source of power. Next comes the Austin reversible road machine, for building and repairing roads. Its steel scraper is mounted between the front and back wheels of the frame and is reversible. The Austin street sweeper shown is of very solid construction; it has a huge brush attached diagonally under the rear wheels, which revolves by gearing connected with the wheels and is thrown out or in by an easily operated double clutch, also being susceptible of elevation in passing over a large obstruction. A hand garbage cart for use in connection with street cleaning is shown. It is a metal can, pivoted in a frame supported on two wheels. The Austin reversible road roller is a huge machine weighing 5 tons, having a large circumference and ball bearings, so that it is drawn easily on a level by two horses. A dump wagon is also shown, which is a most convenient article for contractors' use. It has a steel lined body, and the interior is composed of a steel pan which holds the load. The pan is pivoted nearly in the center and is swung easily by the driver at the touch of a lever by his side. It is strongly built and is capable of very heavy work. A model is displayed of the Austin tubular truss bridge for highways. This is a new field into which the company have but recently gone. The bridge is remarkably strong and light, the main parts being composed of wrought iron pipe held together by the usual tie rods and turn buckles. It appears to be particularly adapted for the construction of moderately long spans for ordinary highways.

The Link-Belt Companies,

as they are called, are the Link-Belt Machinery Company of Chicago and the Link-Belt Engineering Company of New York and Philadelphia. They have a joint exhibit in the northeast section of the annex to Transportation Building. Here they have erected a great framework in which they show in operation six styles of freight and coal handling machinery, conveyors, elevators, &c., all based on applications in some form of the link belt. These six styles shown are as follows: Horizontal box conveyor, horizontal and inclined coal conveyor, continuous bucket elevator, light package elevator, continuous freight elevator with an automatic discharge, and an automatic discharge barrel and sack elevator. They also show a system of manila rope power transmission, operating the entire exhibit. The power is taken from a 25-horse power motor, transmitted to a jack shaft and thence driven by a single manila rope.

San Francisco News.

The hardware and iron trades of this city State and Coast is gradually, slowly, but surely, undergoing radical changes. There have been whisperings of changes during the whole of the past year. This, that and the other house was going out of business. At one time it was rumored that three were going to drop out, and the air was thick with rumors as to the causes. It was said that they could not stand the competition of the East, which could undersell them even in their own markets, and that thus they had to go. The houses have not gone, but some of their proprietors have, some of the most notable men in the hardware trade having passed away forever from the busy scenes of trade and traffic during the past year. Both heads of the house of Baker & Hamilton have left the business, one of the finest in the country, to their successors, and now the heads of the old hose of Huntington, Hopkins & Co. are retiring. Albert Gallatin, the head of the house, and his partners retire with comfortable fortunes and leave the business to five of the leading employees, who will start out in business anew and on new lines. The statement in the local papers that the house was going out of business was entirely devoid of truth. The house was founded away back in 1849-50, in the City of Sacramento, by the gentlemen whose names it bears. The old head of the house, Mr. Huntington, is the only one that survives. It has a historic fame, as the partners were among the founders of the Transcontinental Railroad. But long ago they parted with their interests in the business, which meanwhile had been extended to San Francisco, and for many long years Mr. Gallatin was the head of it. During the year the Sacramento house was discontinued, or, rather, sold out to new men, and now the same thing has happened in regard to the San Francisco house. The railroad people had long ago ceased to have more than a nominal connection with it.

The importation by sea threatens to make an entire change in the currents of trade, as there has been a decided falling off in the importations by rail, and a still more decided increase in the importations by sea. This means that the greater part of the Coast will be supplied from this city as soon as there is any business of moment. The dull state of the general markets has had, of course, considerable to do with the falling off in rail receipts, but it is evident that the railroad will never again be the factor in the hardware and iron and steel trades that it has been in the past. When Oregon, Washington and Southern California have recovered from the effects of the recent financial troubles our San Francisco house will have a very good trade with them—a something which has not happened since the overland road was first opened.

There has been an improvement in the volume of trade during the past two weeks, though the improvement has not been great. The trade are disappointed at the ruling prices, the result of excessive competition, which really in many cases leave no margin of profit whatever. This may be expected to settle itself next year—not, however, before the end of the present season, as the stocks are large and were laid in some time ago. There is, therefore, little room for variation in prices, and in fact there has been none of any importance for some time past.

We have had very few arrivals of

nails during the fortnight, but there were 1215 kegs by sea. There are not much signs as yet of the rebuilding of the Oakland factory, and for months the trade will have to depend on hold over stocks and Eastern supplies.

We are obtaining considerable quantities of Eastern pig iron, the "Shenandoah" and the "Francis" arriving with 450 tons. The market is duller than anything ever on record in this city, the quotation being \$18 to \$19 per ton. There may be said to be no demand for English or Scotch at \$22 to \$23.

There have been no more importations of tin plate for the past two weeks and there does not need to be any for we have enough on hand at present for a five months' supply at the rate of consumption for 1893. There has been a slight appreciation in the market. Coke tin is quotable at \$5.50, though the jobbing rate is \$5.75. Pig tin is very dull at 22 cents.

Labor Troubles at Apollo, Pa.

During last week the Amalgamated Association of Iron & Steel Workers made two direct appeals to the public for sympathy in their disagreements with employers. The first appeal was made on behalf of puddlers, bar rollers and others at Pittsburgh, and the second was made in the interests of locked out sheet mill operatives at Apollo, Pa. In both cases the public were asked to lend their influence for the support of a body of organized workmen who have had steady employment for 12 years past and whose daily earnings up to July 1 this year averaged \$3.75 per day, the minimum individual earnings being about \$1.60 and the maximum \$20 per day. Speeches were made at Apollo last Saturday which were worthy of some great national cause. Attempts were made to introduce patriotism into the questions under consideration, and the right of the Apollo Iron & Steel Company to protect their investment according to their best judgment was entirely ignored. They were told in effect that their desire to operate their works with workmen who were not members of any labor organization, but free and independent individuals selling their labor at a price and upon terms mutually agreed upon, was a direct request that their employees should waive their rights of citizenship.

The facts in the case are that some of the workmen of the Apollo Iron & Steel Company absolutely refused to abide by the provisions of the scale adopted in Pittsburgh in June last, and the Amalgamated Association not taking any action in the matter, the firm was finally compelled to start its plant non-union. At this time eight mills are in operation, and as fast as the wants of their customers demand other portions of the plant will be started up. The firm have experienced but little difficulty in securing competent employees when needed. Realizing the success which was attending the company's efforts, a mass meeting was called and several thousand people listened to speeches made by officers of the Amalgamated Association, preachers and others, who had a direct or indirect interest in the struggle. The speeches were such as are usually heard at meetings of this description. Retail tradesmen were told that their interests were identical with the workmen's, and the conditions of the struggle were likened unto those that have passed into history as fights for personal liberty. So far as the direct question at issue was concerned—

that of the company's right to make new agreements with its workmen individually, after it was known that the agreement made with the men collectively was not being strictly adhered to—nothing was said. Resolutions were passed condemning the action of the Apollo Iron & Steel Company, but so far as can be learned at this writing they will not change their course of action.

Photographing Colors.

On Wednesday week, says the *Engineer*, Leon Warnerke of Champion Hill, London, brought under the notice of the Congress of the Photographic Society at the Society of Arts an item not entered in the official programme. It related to the latest advances in real photography in natural colors. For some months past photographic circles in Paris, according to the French journals, have been delighted with the progress which Lumière et Cie. of Lyons have made with Professor Lippmann's process, and Mr. Warnerke was lent by that firm of dry plate makers about half a dozen of their photographs for exhibition in London for but three days, as they are in demand all over Europe among the scientific societies. The photographs themselves are 3 inches or 4 inches square, in a gelatino-bromide film on glass, and faced with a slightly wedge-shaped piece of glass, to throw aside reflexions not required when the pictures are exhibited on the screen by reflected light by means of the lantern. On the screen on Wednesday night the subjects resembled water or oil paintings, the iridescence being then quenched; their pictorial beauty exceeded all expectation. They were magnified to about 18 inches by 12 inches, and differed in nothing from colored works of art, but in the fact that gold, which was represented in one of the pictures, came out with something like metallic brilliancy; and that in another picture of the laboratory of a chemist, a pictured vessel containing a solution of fluoresceine appeared almost fluorescent. The pictures were landscapes, portraits, and a photograph of a colored print.

The following are the main features of the process used by Auguste and Louis Lumière for taking the photographs exhibited. They make a fine almost transparent emulsion of bromide of silver, consisting of: A, distilled water, 400 grams; gelatine, 20 grams. B, distilled water, 25 grams; bromide of potassium, 2.3 grams. C, distilled water, 25 grams; nitrate of silver, 3 grams. To C half of A is added, and the other half of A to B. The two gelatinous solutions are then mixed by pouring that containing the silver into that containing the bromide. A color sensitiser, such as cyanine, methyl violet, or erythrosine, is then filtered, and the plates coated with exceedingly thin films by the aid of the whirling table, at a temperature not higher than 40° C. The plates are then soaked for a few seconds only in alcohol and dried. Before use they are immersed for a few minutes in distilled water, 200 grams; silver nitrate, 1 gram; glacial acetic acid, 1 gram, and dried; then at once exposed with the film in contact with a reflecting backing of mercury. Messrs. Lumière used the following developer: A, water, 100 parts; pyrogallol, 1 part. B, water, 100 parts; bromide of potassium, 1 part. C, ammonia, specific gravity, 0.960. From these solutions the developer was thus mixed: A, 10

volumes; B, 15 volumes; C, 5 volumes; water, 70 volumes. The developed plate was washed, fixed for 10 or 15 seconds in a 5 per cent. solution of cyanide of potassium and dried. During exposure a colored screen was used; one of them consisted of a solution of primuline in a glass trough with parallel sides. The amount of ammonia present has great influence on the results.

Messrs. Lumière stated to the Photographic Society of France that the foregoing formulæ differ little from those previously made known by M. Valenta of Vienna, whose formulæ in their turn differed little from some which Messrs. Lumière had published at Lyons still earlier. They claim that they get a finer grain in the emulsion than did M. Valenta, and in photographing interference phenomena approximate absence of grain is a vital point.

The chief difficulty with Professor Lippmann in trying to make his scientific discovery practical—work which he might better earlier have left to others—was the length of exposure. Messrs. Lumière et Cie. began with exposures of 40 minutes' duration, and at last, by experience, became able to reduce them to four minutes, no doubt using a portrait or some other lens which would give them abundance of light.

Treasury Decisions.

White Brass.

Before the U. S. General Appraisers at New York, October 14, 1893. In the matter of the protest, 19,129b-133, of Edw. A. Bigham, against the decision of the Collector of Customs at Boston, as to the rate and amount of duties chargeable on certain so-called white brass, imported per "British Empire," January 9, 1893. Opinion by Sharretts, General Appraiser.

The merchandise in question is metal in pigs. This metal is known as white brass, and is composed of 67 per cent. tin, 32 per cent. zinc, and a trace of copper. The appellant claims the merchandise should be classified under paragraph 736. The Collector assessed duty on the same at 45 per cent. ad valorem under paragraph 215. We cannot sustain the claim of the appellant.

We find on the face of the papers that the merchandise is something more than bar, block or pig tin, nor is it known as tin in pigs in trade and commerce. The board is in doubt whether metal of the kind in question in pigs, which is as crude a form as metal is usually imported into the United States, should be classified as metal unwrought under paragraph 202, or as a manufacture of metal under paragraph 215, but inasmuch as we are not called upon to decide this question, we overrule the protest and the Collector's decision stands.

A series of interesting experiments have recently been made at Marseilles, France, on board some tugs, with blocks of solidified petroleum made by a process invented by Lieutenant Maestray of the French Navy. Weight for weight, it was found that the blocks gave three times the heat of ordinary coal, and it is thought that, with some simple modifications in the furnace, they can be made to yield four times the heat. The blocks, in addition, have no waste matter, and it is probable that measures can be adopted to suppress their smoke. It is certain, says *Le Génie Civil*, that solid or liquid petroleum is a combustible of the future which will be of prime importance in connection with steam vessels.

The Harrington Special Foundry Crane.

Edwin Harrington, Son & Co. (incorporated) of Philadelphia have designed a crane especially adapted for use in stove foundries and other places where fine work is required. For the lifting of copes or molds the ordinary chain and sprocket wheel hoist is claimed to be unsuitable, as, no matter how carefully it is made, a chain running over a sprocket wheel will, as each link leaves its pocket, jar the load, which generally results in a cracking of the sand and a breaking down of the mold.

This crane was designed with a view to obviate this difficulty. It will be noticed, by reference to the engraving, that the sprocket wheels of the hoist have been replaced by a drum having right and left spiral grooves, in order to insure the hanging of the hook continuously over the same point. A sure and steady movement, without jumping or jarring, is in this way secured, the chain winding and unwinding with the regularity of a rope on a windlass, and allowing a cope to be lifted and lowered without danger of the sand sifting out or the mold breaking

marking and destroying dangerous wrecks, derelicts and other menaces to navigation on the seas outside the waters of the respective countries bordering on the Atlantic Ocean.

Progress in Foundry Practice.

Thomas D. West of Sharpsville, Pa., in the paper read before the Western Foundrymen's Association, discusses as follows some of the phases of progress in foundry practice:

With our present methods, one field now presenting itself for the acquisition of knowledge in matters of melting and cast iron is in the chemical action taking place in the remelting of iron. I have been greatly interested in the papers and discussions emanating from this organization upon the questions of chemistry, and think the subject of the utmost importance to many foundries. There are those that can get along without having chemical service, but they are very few who could not obtain practical benefit from a use of the knowledge now obtainable upon the question. I know that in the ingot department of our foundry we could not afford to abandon chemistry. Not only do we know the chemical

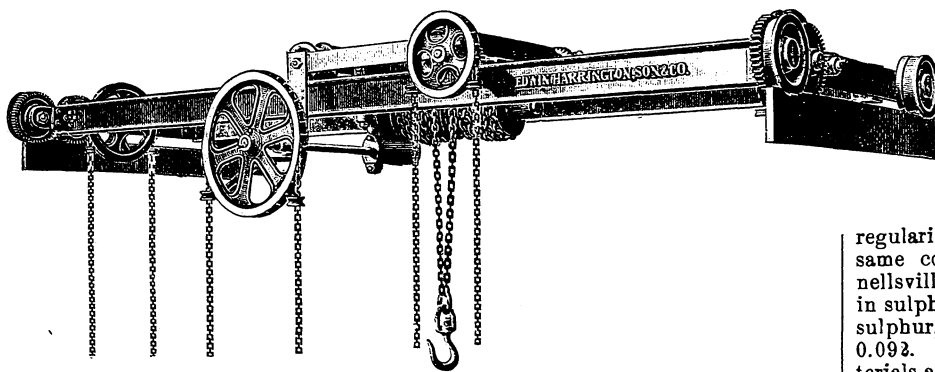
to make it impracticable. With some scrap piles, by taking several samples and mixing their drillings, so as to obtain an average, an analysis might often work very fairly, but such a case would be the exception to the rule. It would be best in such cases, when special results are desired, to abandon the use of scrap and use all pig iron.

The president of our company, Geo. H. Boyd, has formulated quite an elaborate system for recording the chemical and physical qualities of our iron and product coming from it. The way the subject is classified enables us to obtain some very valuable data. As an illustration we will take up the question of silicon and sulphur. Here we find, by remelting or by the action of the fuel and blast in the cupola, that we reduce the silicon from one tenth of 1 per cent. to four-tenths of 1 per cent., but this reduction is generally uniform. We think it is only through some radical change in manipulating the blast to the cupola it is caused to be reduced below two-tenths of 1 per cent. On the other hand, we increase the sulphur one time two-tenths of 1 per cent., and perhaps the next five-tenths of 1 per cent., when using coke of same analysis and in uniform ratio to iron charged. The manipulation of the cupola alone seems to affect the sulphur to a greater degree than the silicon, for the silicon is generally reduced uniformly, while the sulphur seems to have no regularity about its increase; and I am inclined to think the varying temperature existing at time of melting is the main cause of the irregularity found in the sulphur when same coke is being used.

The Connellsville coke we use will average 0.80 in sulphur; the iron 1.50 silicon, 0.040 sulphur, manganese 0.34, phosphorus 0.093. The analyses of the above materials are given so as to enable any one that might be inclined to do so to take the matter up and compare notes with us.

There is a large field for investigation in chemical matters for the founder to explore, and the information to be obtained will enlighten us upon many mysteries we now find ourselves at a loss to fathom. I do not wish it understood that we are wholly relying upon the chemical analysis of iron, for there is too much to be discovered in that line ere we can ignore the physical qualities of iron in judging of and attaining results. While cupola work is progressing in respect to chemistry, I think from my late efforts and results there will be further achievements in melting, barring what might come from the little explored region of electricity.

An investigation of the experiments made in cupolas with a view to economy in fuel shows that there have been many failures and we find almost all plans imaginable have been tried. Europe far surpasses this country in originality and novelty of designs, but I question if America has not excelled in the points of good general utility. The first radical beneficial step we find to have been taken is in the adoption of the "drop bottom," an American invention. Ere this came in use bottoms were composed of solid masonry or fire proof material from the ground up to the spout and in order to get the "dump" or refuse out of the cupola after a heat was finished the "front breast," being made large, would be knocked out and by means of pokers the refuse and cleanings would be raked out. I am led to believe that this plan



THE HARRINGTON SPECIAL FOUNDRY CRANE.

down. The internal gears of the hoist are operated by means of a shaft extended far enough beyond the beam of the bridge to prevent the chain from interfering with the load; this also enables the operator to stand at a respectful distance from a pot of metal. The crane is operated by geared wheels throughout, and the shaft, which is placed inside of the beam to save room, moves the crane by pinions and intermediate gears, all of which are furnished with roller bearings, producing easy movement.

At Detroit last week bids were opened by the Board of Water Commissioners for 3500 tons of pipe ranging in size from 4 to 16 inches, inside diameter. The following bids had been presented: Lake Shore Foundry Company of Cleveland, \$19.45 per ton, delivered in Detroit; Addyston Pipe & Steel Company of Cincinnati, \$19.80 per ton, delivered; Dennis Long & Co. of Louisville, \$20.39 per ton; Howard Harrison Company of Bessemer, Ala., 2000 tons at \$19.20 and 1500 tons at \$21.20.

The House of Representatives has passed a bill authorizing the President to make an international agreement with the governments interested in North Atlantic navigation, for reporting,

qualities of every charge of iron that goes into our cupola, but also that of the coke. When running full our heats range from 50 to 70 tons per day, and the product is analyzed and a record kept, so that we are enabled to ascertain if anything is going wrong and chemically compute what goes in and what comes out of the cupola.

The adoption of chemistry in our foundry was not a question of choice. We were compelled from self defense to know what our product contained, as we found our customers often attributing short service in particular molds to excessive silicon or sulphur when it was plainly not due to these causes. To protect ourselves against claims of this nature, as well as to insure uniform analyses, we found it necessary to know not only the analysis of our pig iron, but also of our product. Comparison of analysis with service naturally followed, which in time resulted in a somewhat elaborate system of records. It might be advisable to state here that in our practice we use all pig iron, and that such practice gives an advantage for obtaining reliable data that foundries purchasing scrap to mix with pig metal could not secure as readily. Generally speaking, purchased scrap iron is a miscellaneous collection of everything, and to attempt to know its chemical composition would generally involve so much labor and expense as

is still being used in some parts of Europe. From the adoption of the "drop bottom," improvements have been mainly in the line of securing greater economy in the use of fuel. The most radical divergence from the common cupola has been caused by experiments in designs arranged as in the Woodward cupola, which sought to create a blast economically by means of a steam jet blowing up the stack; also as in the Krigar cupola, which instead of forcing the blast upward reversed the order; then, again, as in cupolas arranged to utilize gas for a fuel. In examining some of the cupolas that have been tried one would surely think that if crooks and oddity had any virtue, perfect combustion would have been accomplished long ago. This may be secured, but we find more founders have faith in the common cupola. My definition of common cupola is one of plain cylindrical form having one or more rows of tuyeres. The question of inside formation and illogical shapes given to cupolas have about ran their course of absurdity and this has been helped by late literature upon melting. We are rapidly advancing in understanding the principles and sciences involved in the proper construction of cupolas and melting, and to-day we find the only element of any value that has been grasped from out the chaos of ruined expectations in the construction of cupolas is that of economical combustion being attained by two or more rows of tuyeres. In order that all may be able to follow this paper intelligently and understand the philosophy and advantages to be gained by "upper tuyeres" we will first note the action of fuels in order to obtain perfect combustion. "According to Dulong 1 pound of carbon combining with the necessary quantity of oxygen to form carbonic acid develops 12,906 units of heat. The specific heat of cast being about 13, the melting point 2190°, and the coke containing 82 per cent. of carbon, then to heat a ton of cast of a temperature of, say, 40° to a temperature of 2190° would

$$\text{require } \frac{2150 \times 2240 \times 0.13}{12906 \times 0.82} = 59.1$$

pounds coke. This is supposing that the whole of the carbon is converted into carbonic acid, but if by any means carbonic oxide is formed a very different result is obtained; then 1 pound of carbon to carbon oxide only evolves 4453 units of heat. If, however, by admitting air above the zone where the oxide is formed we recover 4478 units, this plus 4453 gives 8931, which is a little over two-thirds of the available heat to be gotten out of 1 pound of carbon. Allowing 10 per cent. for moisture in the coke, 10 per cent. for radiation and 20 per cent. for loss of heat passing off at the top of the cupola, or 40 per cent. in all, the amount of coke per ton of metal should not exceed 112 pounds, although the actual consumption is, as we have shown, usually much higher."

The combination of carbon with oxygen or air blown through the "lower tuyeres" produces carbonic acid gas in the bottom bed of fuel and this in passing up through fuel heated to incandescence takes up more carbon and is converted into carbonic oxide gas. Now, if the carbonic oxide can again have sufficient oxygen or air admitted to it we will again have carbonic acid, or more nearly complete combustion, and by such alternate zones, which at every repetition become less violent, we could, if it were only practical to hit the right

spot of the descending stock with the proper amount of air, almost achieve the theoretical figure of melting 1 ton of iron with 59 pounds of fuel, as given in above table; but instead of that we consider if we can accomplish such with 200 pounds of fuel we are doing exceptionally good work.

We have cupolas figured to achieve the above results by combination in tuyeres and in reality cupolas having two or more rows of tuyeres can be the only ones properly entitled to the claim of being scientifically constructed as far as the admission of blast is concerned. Were it only possible for the blast passing through their tuyeres to penetrate to the center of the cupola and have an immovable zone of fuel to play into, they might successfully accomplish the end intended, but as it is the results are but partial. It is a question if the extra burning out of the lining which two or more rows of tuyeres cause by having more melting zones does not often more than compensate for what saving in fuel may be acquired.

Power House Engines for Electric Railways.

Concerning power house engines for electric railways the most essential points—as pointed out in a report submitted by E. G. Connette to the American Street Railway Association in convention at Milwaukee—to be considered are: 1. Perfect regulation. 2. Highest economy. 3. Greatest durability. 4. Division of power into units.

On an electric railway the variation of load amounts to a very considerable fraction of the whole maximum load; in small plants it may be 95 per cent. of the maximum, and in large plants it is frequently 50 per cent. The governor should be so constructed as to control the engine under any variations of load, with a variation of speed not to exceed 2 per cent.; be easy of access to all its parts and capable of being oiled while the engine is running. The cut off must be larger than in engines for less variable load and should be easily regulated between the limits of one-tenth and seven-tenths of the stroke. The severe conditions of high speed and sudden and extreme variations of load make it especially important that the engine have the best possible construction, with extra weight in the fly wheel and bed plate, and that the foundation be more than usually substantial, and also that the engine be placed in the hands of a competent engineer.

In order to obtain the highest economy in operation the engine should be properly adjusted to its load. Underloading or overloading is undesirable, though the compound condensing engines of the largest stations will stand underloading better than the simple high speed engine. Careful attention should be given to the setting of the valves so that the cut off will be the same at both ends of the cylinder. The report refers to the steam turbine and mentions that the Parsons has developed power at the rate of 20 $\frac{3}{4}$ pounds of water per electrical horse-power per hour. This is a strong rival to the reciprocating engine as a steam motor for electric power and light stations.

The boiler plant should have ample capacity, as there are few cases where the draft and setting are so excellent as to allow heavy forcing without a serious loss of economy. A good plan to encourage economy in the use of fuel on the

part of the fireman is to pay him a coal premium at the end of each month, basing the amount of the premium paid on the average number of bushels of coal consumed each day during the month for a certain number of cars run. When the plant is of such size as to require more than two firemen, it will always be good economy to employ mechanical stokers.

The report cites the test of the Twin City Rapid Transit Company of Minneapolis and St. Paul. On the comparative value of the two fuels, coal and oil, this test showed that with the ordinary Lima oil weighing 6 $\frac{1}{8}$ pounds per gallon and costing 2 $\frac{1}{2}$ cents per gallon, and coal that gave an evaporation of 7 $\frac{1}{2}$ pounds of water per pound of coal, the two fuels were equally economical when the price of coal was \$3.85 per ton of 2000 pounds. With the same coal at \$2 per ton the coal was 37 per cent. more economical, and with the coal at \$4.85 per ton the coal was 20 per cent. more expensive than the oil. These results include the difference in the cost of handling the coal, ashes and oil.

Local surroundings and conditions will, to some extent, govern the division of power into units, but, as a rule, the following principle will be safe to follow: The size of the proper unit of subdivision should be such as to give the required relay or reserve above the maximum power adopted. This will apply equally to boilers, engines and dynamos. The following table will serve to show approximately the proper proportion:

Maximum horse-power required to operate road.	Number of engines required,	Horse-power of each engine.
200	2	200
400	3	200
600	3	300
1,000	3	500
1,500	4	500
2,000	4	750

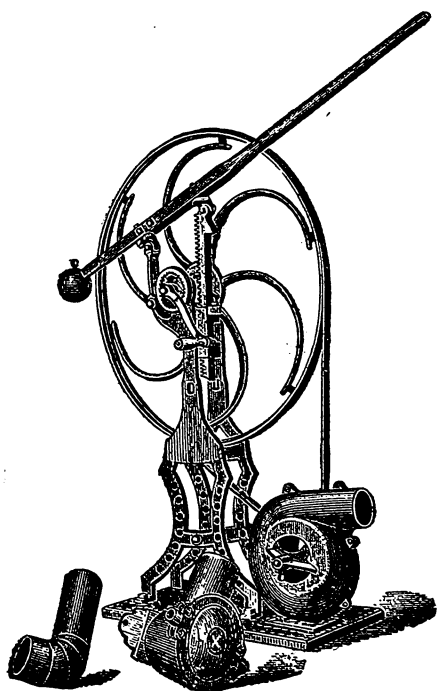
It will be observed from the above table that enough engines are provided to furnish the maximum horse-power required to operate a road and have a surplus of one engine. This is very essential, as it enables the engineer to keep his engines in perfect adjustment and repair, having at all times an extra engine to work on, or, in case of breakdown, the extra engine is ready to take the place of the disabled one. The "maximum horse-power required to operate the road," referred to in this table, is not to be taken as the sum of the power needed by each car in service, except in case of small installations, since the maximum power required does not increase in proportion to the number of cars in use, since the line losses are not materially increased with increased traffic, and because, as the number of cars increases, the fluctuations of load tend to balance themselves and to reduce the maximum load nearer to the average load. Thus in a ten car plant, cases will occasionally occur when all of the cars will require their full power at the same time, and the power plant must be planned accordingly, and there is no probability that all of the cars of a 100-car plant will all require their full power at the same time; from 60 to 75 per cent. of this power, depending upon local conditions, will be sufficient for this plant.

In selecting a type of engine, the size of the installation must largely govern, as well as local conditions, such as water supply and price of fuel, though some consideration may be given to opportunities for station room and arrangement. For small plants to run 10 or 15 cars, simple high speed engines, belted direct to generators, are unques-

tionably the proper choice. For 20 to 50 car plants, compound engines, with condensing apparatus where it is possible; with tandem compound engines for the smaller plants and cross compound engines for the larger ones, geared direct to generator, will probably be found most economical. While for the larger systems compound or triple expansion condensing engines, using steam at a high initial pressure and either driving a countershaft or coupled direct to generator, whichever the conditions of the case will warrant, will be found a proper selection. In every case, except for small plants, where engines are belted direct to generator, the vertical type of engine is recommended.

The Tornado Fan Blower.

This blower, which is made by J. G. Hoffman of 4937 Forrestville avenue, Chicago, can be operated by either



The Tornado Fan Blower.

crank or lever, as each works independently of the other. The fan proper is of cast iron, while the fan shaft is cold rolled machinery steel. This shaft runs on centers, which can be adjusted as may be necessary. The steel crank shaft is mounted in cast iron bearings. The crank hangs loosely on the shaft with which it is brought in connection, when turned, by a simple arrangement of pawl and ratchet wheel. Provision is also made for operating the fan by means of the lever shown, which connects with the shaft by a ratchet wheel and pawls. All the parts of these blowers are made on the interchangeable plan.

The London *Ironmonger* reports that the Thomas basic patent, which is owned by two concerns in Germany—viz., the Hoerde Verein and the Rheinische Steel Works—will expire in April next, and thereafter these two companies, which have for some years past received considerable sums from other ironmasters for the right to use the process, will be deprived of an important source of revenue. The Hoerde Works will endeavor to find compensa-

tion by granting licenses for the desulphurizing patent, which belongs to them exclusively, but the Rheinische Works have no such resource available. During the last financial year the Hoerde Company are stated to have received in payments from German firms on account of the Thomas process 211,487 marks, against 87,992 marks in the previous year, while the Rheinische Works netted 238,344 marks, against 123,637 marks. As the Thomas patent expires at the same time in Austria-Hungary, the Hoerde Company will also lose their royalty rights in those countries, the amount received therefrom for the past year being reckoned at about 137,000 marks.

Use of Storage Batteries in Electric Generating Stations.

At the recent meeting of the American Street Railway Association in Milwaukee, C. O. Mailloux presented a valuable report on the use of storage batteries in electric generating stations for utilizing and regulating power. In this report the author uses the term "variation" to designate the effect caused on the station plant by putting on or taking off a certain number of cars, and the term "fluctuation" to designate those incessant and erratic ebbs and flows of current which are so familiar to us all, due to the starting and stopping of cars, changes of speed, grades, &c. It is for the purpose of better utilizing and economizing this power that the storage battery is proposed to be used, by taking advantage of its property of being able to give and take energy, and thus keep the load balanced and equalized at all times.

The author illustrated by curves the performance of the storage batteries placed in the Edison station in Fifty-third street, New York. Their chief function is to relieve the other stations at the hours of heavy load, by delivering into the mains a certain amount of current that would otherwise have to come, and at greater loss or "drop," from one or another of the stations connecting with the network of mains. Hence the load may be varied more or less arbitrarily at these stations according to the proportion of load that the larger stations are desired or able to carry.

The battery is installed on the second floor above the engine and dynamo room, and consists of 140 cells each of about 1000 ampère hour capacity, weighing some 750 pounds, and of about 48 inches in length, 21 inches in width and 15 inches in depth. The battery has a normal discharge rate of about 200 ampères, but can be discharged, if necessary, at 500 ampères.

The first curve, giving the record for April 22, 1893, was taken when the station was running only 12 hours per day, from noon to midnight. Calculation shows that the battery furnished about 23.2 per cent. of the total energy delivered to the mains. The maximum rate of discharge attained by the battery was about 270 ampères. Thus, in this case, we have an example of a battery which is used for the purpose: 1. Of giving a load to station machinery that would otherwise be idle. 2. Utilizing the stored energy to increase the rate of output of the station at the time of heavy load, which would otherwise necessitate greater dynamo capacity. In the second curve, taken five months later, the conditions have been changed. In the first place the station output has increased greatly, being

now about 2.9 times greater, and it is also continuous. The next station now runs from 8 a.m. one day to about 2 a.m. the next day, or 18 hours. When it starts at 8 a.m. it carries a twofold load: 1, the regular load allotted to this station, and, 2, in addition thereto, the current absorbed by the batteries in charging. The total load is much more uniform than if the station were feeding into the mains alone, for the extremes of current fluctuations represent a total variation of only 80 ampères on an average load of 850, or less than 9½ per cent. The battery is now being made to play an additional part of some interest. The maximum load has increased to such a point that the station plant is no longer adequate; and consequently the battery is put on to "cap" the summit of the load and supply the excess for current required above the capacity of the dynamos. When the load begins to fall off (about midnight) a part of the plant is shut down; but since the load is still too heavy for the other dynamos, the batteries again serve to supply the excess.

In Europe great headway has been made in this branch. In London eight stations, aggregating 200,000 lights, are provided with storage batteries, the batteries in some instances being situated in substations. In Paris there are nearly 30 such substations, all charged from the same central station. In the "Edison sector" of the city an interesting application is made of a large (2800 ampère hours) battery, which is located at a point somewhat distant from the central station, and connected with the mains from which it is charged at those hours when the load is light by taking current from the mains themselves, the potential being regulated by means of a continuous current transformer. Thus the battery in this case saves the cost of larger feeders, while it also furnishes a load for the hours of small load.

This plan suggests itself as of possible service in electric railway systems covering a large area of territory all fed from a single central station. The batteries could be located at distant points, or at such points as would give the best distribution of current to the trolley lines with the least expensive line work. The station machinery would then virtually work at constant load to feed the batteries, which latter would supply the power needed for the car motors. In this way not only would an economy in the cost of conductors be effected, but there would be more uniformity of potential all over the system.

As regards the batteries used the author stated that the principal object to be aimed at was long life and high efficiency, even at the expense of increased first cost. The Planté process of formation and its modifications would seem to have proven itself superior to the pasting or Faure process, if one can make a criterion of the fact that at least nine-tenths of the aggregate of the central station batteries used are of the Planté type or some modification thereof. The Planté batteries are conceded to be, usually, of lower capacity per pound, but on the other hand they have the advantage of being able to carry heavier rates of charge or discharge.

A commission, appointed by Secretary Herbert, has proceeded to New Orleans to make a survey of the site for a proposed naval dry dock in or near that city.

Washington News.

(From our Special Correspondent.)

WASHINGTON, D. C., October 31, 1893.

The annual summing up of the operations of the Naval Steel Inspection Board, composed of Capt. J. A. Howel, Chief Engineer David Smith and Lieutenant-Commander J. G. Eaton, shows the most flattering results in the matter of tests at the place of manufacture.

Lieutenant-Commander Eaton remarked:

"At first manufacturers complained of the severity of these tests, and they did find some difficulty in complying with the Government requirements. At first the rejections were up to 80 and 90 per cent.; now they range from but 1 to 5 per cent. There are some differences in the product of different establishments, affected, however, more by fuel or impurities of the oil. Some firms try to work in cheaper ores, others use pure ores and are invariably up to the requirements. The manufacturers are now satisfied with the wisdom of the schedule of tests laid down and of the steady improvement of their product in consequence of being kept up to the specifications."

Chief Engineer Smith and Lieutenant-Commander Eaton agreed that there might be some trouble at first in working the bolt holes of armor plates first and tempering afterward on account of expansion. Although this difficulty has been in a great measure overcome, it is now found practically impossible to work the plates for fastening after they have been tempered.

The tests of armor plates at Indian Head were not under the Steel Inspection Board, but under the Bureau of Ordnance. The results have, however, in every case sustained the care and accuracy of the tests at the place of manufacture by the inspection officers of the Steel Inspection Board.

The assertion of Chairman Wilson of the Committee of Ways and Means that he would be prepared to report the tariff revision bill by November 1 is amended by him in conversation today on the subject.

It is more likely to be ready in December or January than November, and if it were practicable to get out of the dilemma in some satisfactory way it is evident that some of the former revision members would not seriously antagonize a withholding of the subject until a more auspicious period of industrial energy and business activity.

The majority on the committee in some cases have been receiving some very plain letters from constituents whose opinions they are disposed to regard. These have infused a more conservative spirit among them than exists among their colleagues representing districts with few industries and those unimportant.

The silver question in the Senate has so overshadowed all other public questions that the tariff situation has been lost sight of in a measure. But now that the end of the silver discussion has been reached they intend to work under forced draft and get the bill before the House as soon as practicable. Chairman Wilson admits that the committee are not going ahead as rapidly as they had planned owing to the written protests which are being filed. They still adhere to the free raw material theory, with coal and iron ore prominent on the late proposed free list, and a 25 to 30

per cent. horizontal reduction on all other articles. For the purpose of raising revenue as a substitute for reductions or loss in the customs the Subcommittee on Internal Revenue are working on a graduated income tax and an increase in the internal tax on malt liquors and spirits. This has been practically agreed to. It is expected that the last two items will afford increased revenue enough to warrant a very radical revision of the rates on customs. It is also expected that the reduction of the rates on pig iron, steel rails and all other metallurgical products, as well as other manufactures, will still further increase the revenues through enlarged importations.

Chairman Wilson of the Committee on Ways and Means, speaking about the statements having their orbit in the press concerning the tariff revision bill, said to the correspondent of *The Iron Age* to-day:

"It is safe to say that you can put down ninety-nine out of every hundred assertions about our work in committee as the merest guesses and untrue. The subcommittees are at work and are making progress slowly. We do not expect to have the bill before the whole committee for quite a while, and when it gets there it may be a little while before it gets to the House. That will depend, of course, upon how far the minority members of the committee may wish to go into details. If they simply record their opposition in gross to the whole bill and make a minority report, that will not take much time, but it looks now as if it would be some time before the bill reaches the House. I cannot say how long, as such matters are subject to many contingencies."

"I have not received any letter from Mr. Carnegie, nor has any member of the committee so far as I am aware. The metal schedule is not being adjusted in rates to his views nor to those of any one else except the members of the subcommittee at present. They are giving this, as all other schedules, careful investigation, but no definite conclusions have been reached. The fixing of tariff rates should be a matter of careful adjustment, so that all parts shall bear a relation to each other and be harmonious."

"It was known at the time that during the arrangement of the present tariff act of 1890 Mr. Carnegie got the credit of having made some statements which, as a manufacturer, did not harmonize with the claims of his contemporaries in certain branches of metallurgical industries. It was alleged that he said to a certain member of the committee of that day that steel rails could stand a reduction of duties to \$5 a ton, and that \$8 would be fair. That gentleman, a Republican who was credited with having obtained that information and communicated it to his colleagues, is on the present committee. If it is stated that I have a letter from Mr. Carnegie on that subject I have not seen it. We intend to deal fairly with all branches of industry."

The following important interview took place between a prominent member of the majority of the Committee on Ways and Means and the correspondent of *The Iron Age*:

"The two articles, coal and iron ore, will be placed on the free list. I do not see how we can do otherwise. One of the cardinal features of the tariff revision is free raw material, and those two items are prominent in that category. I believe it will be done by a strict party vote in committee."

It is known that the subject has al-

ready been talked over and that is the drift of opinion. In reference to the prospect in the House it was replied:

"I think when these items on the free list get into the House they will give rise to a bitter contest. It would be difficult to give the result in advance of a canvass with the bill before the House, but in a general way it might be anticipated that States like Virginia, West Virginia, Georgia, Alabama and Tennessee would have a strong influence upon the action of members from the Southern States. The contest would be to strike coal and iron ore from the free list. On a full vote it would take a change of about 65 votes to defeat the committee's recommendation on these items. This is a large vote, but with the New England, Middle States and some of the Western with the Southern States directly interested, it could be done. The item of coal might stand, but it is very doubtful whether the committee can hold iron ore on the free list. This is a very widely spread industry and will find many champions on the floor of the House."

There is very little doubt that the committee will put these items on and it is equally apparent that they will not make a very desperate struggle to keep them there.

Engineer in Chief Melville has been more than gratified by the behavior of the engines on the "Columbia" during their recent preliminary trial. Between the lines while reading the report of the officers on board, he said, "\$200,000 in Cramp's pocket, with a possible \$250,000. I do not believe Cramp would take that for his chance. A speed of 21.8 knots without forcing makes her sure of 22 knots, with a possible 22½ that will make the 'Columbia' the fleetest cruiser afloat."

"The 'Blenheim,'" added Chief Melville, "About the size of the 'New York,' claims 22 knots. The other British ship, the 'Blake,' claimed to be the fastest war ship on the ocean, has never run off her forced draft. She has only had her steam trial. We would now like to know what she can do under the highest conditions. I think when the official record is made the United States can claim in the 'Columbia' the fastest cruiser in the world."

"I think the eyes of the naval experts of the world will be centered upon the 'Columbia' when she starts on her official test of speed."

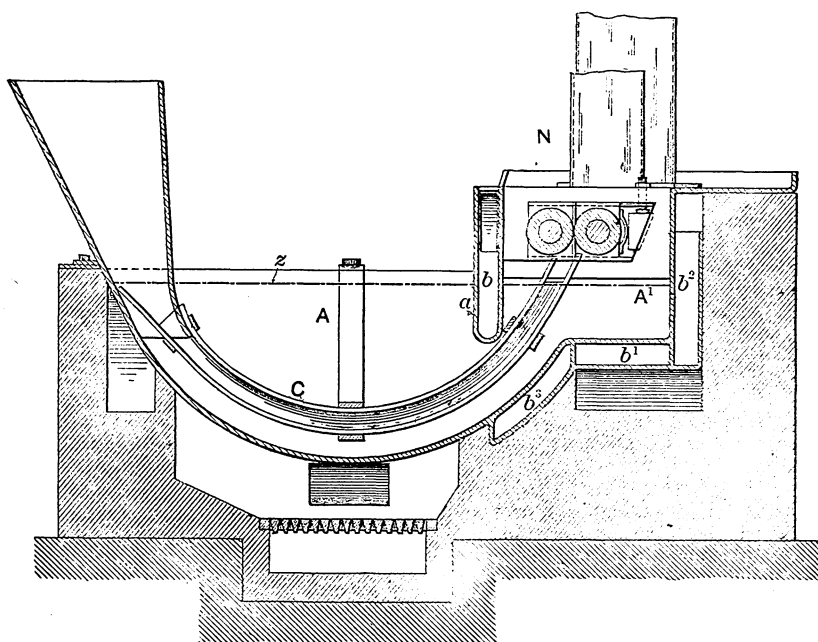
To promote the proper care of boilers when not in use the following order has been issued to the French Navy by the Government: On board all ships in the reserve, as well as those which are laid up, the boilers will be completely filled with fresh water; and this is to apply to shell boilers as well as to those of the tubulous or pipe type. In the case of large boilers with large tubes there will be added to the water a certain amount of milk of lime, following the instructions furnished by Belleville & Co. for the preservation of the tubes of their boilers, or a solution of soda may be used instead. In the case of tubulous boilers with small tubes milk of lime or soda may be added, but the solution will not be so strong as in the case of the larger tube, so as to avoid any danger of contracting the effective area by deposit from the solution; but the strength of the solution will be just sufficient to neutralize any acidity of the water.

The Jaques Tinning Pot.

We show in the accompanying engravings a new tinning pot for which a patent has just been granted to George W. Jaques of the firm of A. A. Thomson & Co. of New York City. Our section shows the position of the bath and the arrangement of the special feature of the pot, which is the air flue at the exit N. The object in the construction is to obtain two temperatures at the bath with one fire and to regulate the temperature of the metal under the grease pot. The great difficulty heretofore has been that plates in their continuous passage through the metal became so highly heated at the delivery end that they ignited the oil, while if two fires were used to regulate the temperature greater expense was involved. Another method of overcoming the difficulty, to which the patentee refers, is the passage of air currents about

the cooling flues the air enters either through the flue in the chimney or into a separate uptake. The front flue b and back flue b^2 are connected by a cross flue; on the other side, where the uptake is situated, the several flues b , b^2 , b^1 and b^2 open into a cross flue, which forms the enlarged base of the uptake. The arrangement is such that the air may be allowed to flow through any one or more flues, and may be regulated by register slides, thus controlling the temperature of the metal and oil within the inclosure A^1 and keeping it normally below the temperature of the main portion of the bath instead of permitting the oil and metal to become gradually hotter from the passage of the hot plates.

The Chicago, Milwaukee & St. Paul Railroad is now testing a 12-wheel passenger engine recently built under a guarantee by the Rhode Island Loco-



THE JAQUES TINNING POT.

the grease. A is the main portion of the bath with the furnace under it. The sheets are fed at the left hand and delivered at the right hand, being guided along the bottom of the bath by the guides C. They are drawn out through the grease through rollers. At the delivery end is an inclosure, A^1 , the side A of which dips down into the metal in the bath, thus cutting off from the main bath a portion, within which inclosure the oil rests on the molten metal. The dotted line z shows the usual level of the metal in the bath, the oil level being at about the axes of the rollers. A special feature of this apparatus is the control of the temperature within the grease pot A^1 , maintaining it lower than the main body of the pot by means of air flues. The walls and bottom of the inclosure A^1 are made double, so as to leave flues around the inclosed metal and oil through which the air may be made to circulate. In the illustration four flues are shown, b , b^2 , b^1 , b^2 . The flue b^2 is under the curved portion of the bottom of the bath, the flue b^1 is under the flat portion or shelf of the bottom of the inclosure A^1 , and the flue b^2 is in the wall opposite A. After circulating through

motive Works of Providence. Although in all there are 12 wheels, the machine is of ten-wheel type, six of these being drivers of unusual size for this class of locomotives—6 feet 6 inches in diameter. The total length of engine and tender is over 63 feet, the wheel base is 50 feet 6½ inches, the driving wheel base is 13½ feet, the total weight in working order is 150,000 pounds; the weight of the tender is 75,000 pounds, the weight on the drivers is 90,000 pounds, the cylinders are 21 and 31 inches in diameter by 26 inches stroke, the heating surface covers 1788 square feet, the steel boiler has 272 tubes, the fuel capacity of the tender is 6 tons and the tank holds 4000 gallons.

The Bethlehem Iron Company, Bethlehem, Pa., have shipped a conning tower weighing 17 tons to the Norfolk Navy Yard for the gunboat "Amphitrite."

James A. Potter, late of the Potter & Atherton Machine Company, Pawtucket, R. I., has sailed for England, where he will enter into business in Accrington.

Speed Premium for War Vessels.

Although the Government has been compelled to pay vast sums as premiums to vessels that exceeded the requirements called for by the specifications, the policy of offering prizes has been wise. In addition, in more than one case the premiums obtained by the vessels have permitted the builder to make a profit, whereas, at the contract price and without the premium he would have to shoulder a loss. In the early stages of the building of the present navy bidders were inexperienced and in some cases were not perfectly equipped for doing the work. Without the premiums they would therefore have lost on the job.

In earlier years, when horse-power was paid for instead of speed, the "Yorktown," at \$100 per unit of excess, earned \$39,825, while the "Baltimore" gained what was then considered the magnificent sum of \$106,441.80 by an excess of 1064.418 horse power. The "Newark," on a similar reckoning, earned \$36,857.70 as her premium. The "Philadelphia" was built on the speed basis, under a guarantee of 19 knots, with an allowance of \$50,000 for every additional quarter, and made 19.678 on her trial trip, thus receiving \$100,000 extra, the Government not allowing premiums or exacting penalties for fractions of a quarter knot. The "San Francisco," on the Pacific Coast, was another great premium winner. The gunboat "Concord" earned only \$453 premium, her horse-power in excess of the contract being but 4.53; but her sister ship, the "Bennington," had an excess of 36 horse-power, and so earned about \$3690. The "New York," on an allowance of \$50,000 per quarter knot, made \$200,000 extra. The "Detroit," with \$25,000 per quarter knot, made six and nearly seven additional quarters, as has been said, and earned \$150,000.

The "Montgomery" and "Marblehead," two sister ships of the "Detroit," are expected to do as well, making \$300,000 for the pair. The "Olympia," on the Pacific Coast, counts on a big premium, and the "Castine" has already beaten the preliminary trip of the "Machias," her sister ship, which was a premium winner. The "Columbia" alone is expected to win at least \$200,000, and will only have to show a knot above the contract to get it. A knot and a quarter will earn \$250,000.

There are, on the other hand, penalties for shortcomings exactly equal to the premiums offered. Thus the "Charleston," which was guaranteed to produce 7000 horse-power, reached only 6666, so incurring a loss, at \$100 per unit, of nearly \$33,400. The little "Petrel" fell short in like manner of her contract speed. The "Monterey" is still another vessel that did not reach her guaranteed horse-power, and the loss was over \$32,800 to the builders. But Congress remitted the "Charleston's" penalty, as there was something misleading in the plans and information procured from England for her builders to work from; and it also came to the relief of the builders of the "Petrel."

The time penalties afford a considerable source of offset for the Government's outgoes in premiums, and can easily be borne where a heavy speed bonus is secured. In the case of the "Concord" and "Bennington," however, the small premiums were more than wiped out by the time penalties.

THE WEEK.

The Standard Oil Company have just received what is probably the finest oil barge ever built. It was constructed at Roach's shipyard, Chester, Pa., and is built of steel throughout. The vessel has a molded length of 243 feet, beam 37 feet and depth 19 feet, and possesses a carrying capacity of 760,000 gallons in bulk, with a gross tonnage of 1599. She is schooner rigged and carries four masts.

Japan claims to have the swiftest cruiser afloat, in the "Yoshino," lately built for the Japanese navy by Armstrongs. The vessel, which is 350 feet long and of 4000 tons displacement, is said to have made an average speed, with and against tide, of 23 knots an hour.

Crop failures and the large migration of farmers to the newly opened Cherokee strip are said to have almost depopulated a section of Southwestern Kansas. The secretary of the State Senate reports that in six counties at least the general exodus has been sufficient to disentitle them to representation in the Legislature.

The Irrigation Convention, lately in session at Los Angeles, Cal., is likely to give considerable impetus to the irrigation movement in the West, where nearly 300,000,000 acres of land might be made productive and populous by the general adoption of such a system. Congress will be urged to take up the matter at as early a date as possible.

The State Pardon Board of Pennsylvania, in session at Harrisburg last week, refused to recommend executive clemency to Hugh F. Dempsey, ex-master workman of District 3, Knights of Labor, and Robert Beatty, convicted for participation in the Homestead poisoning cases and now undergoing sentence in the Riverside Penitentiary.

Coastwise traffic between New York and Southern ports has shown a large increase during the past week or two, a number of extra steam vessels having been put on to meet the demand for freight. Provisions and dry goods compose to a large extent the cargoes going south, while cotton fills the north bound steamers. An unusually large amount of cotton is now in this city awaiting shipment to Europe.

The mysterious purchase by a New York commission house, within the past few days, of the new American built steamer "El Cid" of the Morgan line and her alteration into an armed cruiser, together with the acquisition by the same parties of some \$200,000 worth of arms, has given rise to much speculation as to the destination of the purchases. The general conviction is, however, that the Brazilian Government are the principals in the transaction. Later reports have it that Ericsson's submarine torpedo boat "Destroyer" and the swift steam yacht "Feisen" have also been secured for the same quarter, as well as "El Rio," sister vessel to "El Cid."

A delegation of merchants and carriers doing business with Venezuela, Colombia and Hayti interviewed the President, at Washington, on Saturday, with the object of obtaining a suspension of the policy of retaliation against those republics.

The new United States gunboat "Machias" returned to the Brooklyn Navy

Yard from her final trial at the end of last week. The trial trip extended a distance of about 360 miles, and the "Machias" was kept under persistent headway for 48 consecutive hours, being put through a searching inspection in every detail. The Board of Inspection reported her as acceptable, and the vessel was accordingly accepted by the Government. She will probably be ordered to the China Station shortly.

Statistics of the coal production of the United States for the year 1892, just issued by the Geological Survey, showed that 179,000,000 tons were put out last year, valued at the mines at \$207,566,381. Of this amount Pennsylvania furnished 99,000,000 tons, or more than one-half.

The bill to grant an American register to foreign built vessels has been favorably reported to the House by the Committee on Merchant Marine. The bill will probably secure the early consideration of Congress.

Petroleum has been discovered in Susquehanna County, Pa. The Standard Oil Company are leasing all the land possible and will proceed with the boring of wells immediately.

Trade Publications.

THE VENTURI METER.—This meter—the invention of the well known hydraulic engineer, Clemens Herschel—is very fully described in a pamphlet by the Builders' Iron Foundry of Providence, R. I., who manufacture it.

The meter is named from the Italian philosopher Venturi, who first called attention, in 1796, to the relation between the velocities and pressures of fluids when flowing through converging and diverging tubes.

It consists of two parts—the tube, through which the water flows, and the recorder, which registers the quantity of water that passes through the tube.

The tube takes the shape of two truncated cones, joined at their smallest diameters by a short throat piece. At the up stream end and at the throat there are air chambers, at which points the pressures are taken.

The action of the tube is based on that property of the Venturi ajutage which causes the small section of a gently expanding frustum of a cone to receive, without material resultant loss of head, as much water at the smallest diameter as is discharged at the large end, and on that further property which causes the pressure of the water flowing through the throat to be less, by virtue of its greater velocity, than the pressure at the up stream end of the tube, each pressure being at the same time a function of the velocity at that point and of the hydrostatic pressure which would obtain were the water motionless within the pipe.

Usually the tube is made of cast iron, with a bronze throat piece, or a bronze lining in the throat.

The recorder is connected with the tube by pressure pipes which lead to it from the chambers surrounding the up stream end and the throat of the tube. It records the flow of water so that readings may be obtained in the ordinary way, and is as durable and not more complicated than an ordinary eight-day clock. It may be placed in any convenient position within 1000 feet of the tube, and there may also be an electric device by which the record may be made at any distance (several miles if desired) from the meter. It is operated in part by a weight and in part by clock work.

The difference of pressure or head at the entrance and at the throat of the meter is balanced in the recorder by the difference of level in two columns of mercury in cylindrical receivers, one within the other. The inner carries a float, the position of which is indicative of the quantity of water flowing through the tube. By its rise and fall the float varies the time of contact between an integrating drum and the counters by which the successive readings are registered.

Usually the integrating drum revolves once in every ten minutes, and at each revolution the counter registers, on ordinary dials, the volume flowing for that period of time. This interval of time may be shortened if desired.

There is no friction of stuffing boxes to retard the movement of the float and impair its accuracy, for the integrating drum is inclosed in a shield or vessel which is practically an enlargement of the receiver in which the float moves, and the shafts passing through the stuffing boxes are driven positively by the motive weight, the province of the clock work being to pull a lever and set a stop at the required periods.

There is no limit to the sizes of the meters nor the quantity of water that may be measured. Meters with 24-inch, 36-inch, 48-inch and even 20-foot tubes can be readily made, and can be set with no more difficulty than ordinary pipe.

The meter is not affected by water hammer or substances in the water. It is accurate and enables measurement of large volumes of water to be obtained with little difficulty where, perhaps, they could be measured only laboriously or approximately and clumsily.

The meter is useful for irrigation systems and for mills and factories as well as for water works. A 36-inch meter measured the main water supply of the World's Columbian Exposition and a 6-inch meter was on the supply of the Waukesha Hygeia Mineral Springs Company, who furnished the drinking water for the fair.

TWO CATALOGUES have been received from D. Saunders' Sons of Yonkers, N. Y., one illustrating their well-known pipe machinery and the other their hand tools for cutting and threading gas and steam pipe. These catalogues cover the entire line of pipe threading machinery and the necessary parts and attachments. The facilities of this establishment are such as to enable them to present a class of tools made from carefully studied designs, and intended to meet the present demands of the trade, which call for strong, accurate and durable hand tools and machines.

WE HAVE RECEIVED from the Waterbury Farrel Foundry & Machine Company of Waterbury, Conn., a catalogue of their drop presses. Among others the following machines are illustrated: Round and square slide foot presses, foot press with iron kick treadle, foot press extra high and with extra wide bed, weighted compound lever foot press, screw presses, portable drop presses, drop hammers with automatic lifters, die sinking machines and die grinders, bicycle spoke upsetting and heading, and threading machines, &c.

We take the following from the *Railway Age* because it has a much wider application than to railroads alone: "A certain president was saying the other day that popularity among his employees was one of the worst traits that a railway official could have. It was always, he said, expensive to the road in the long run, and when a man came to be too well liked it was time he went to some other road. There is a good deal of shrewd truth in the remark, however unkind and illiberal it may sound. There is a kind of popularity which degenerates into familiarity and sapping on the back, and that, if it does not breed contempt, is certain sooner or later to injure the discipline of the road. Popularity which is won at the expense of respect is a dangerous attribute for any man who has to keep control of others; and even worse is that popularity which an official sometimes gains at the expense of his own superiors and of the other officers of his road. As soon as a division superintendent or an assistant of any kind stoops to win popularity among his subordinates at the expense of his chief, it is time he was got rid of. Perhaps the chief may deserve it and ought to be got rid of, too. But the other should go first."

The Iron Age

New York, Thursday, November 2, 1893.

DAVID WILLIAMS, - - PUBLISHER AND PROPRIETOR.
CHAS. KIRCHHOFF, - - EDITOR.
GEO. W. COPE, - - ASSOCIATE EDITOR, CHICAGO.
RICHARD R. WILLIAMS, - HARDWARE EDITOR.
JOHN S. KING, - - - BUSINESS MANAGER.

The Outlook.

A study of the causes which have led to the prolonged business depression possesses interest chiefly because their correct appreciation will enable business men to observe the signs of a return to a normal condition. We believe that it is quite generally acknowledged that the distrust on the part of foreign holders of securities as to the inability of our Government to continue the monthly purchase of silver safely was the first impetus on the downward path. When the financial cyclone struck first our banks and then our business and manufacturing community, consumption was proceeding at a normal rate. The condition of the money market cut off all those enterprises of a public character which depend upon the marketing of new issues. The iron industry was among the first to feel the effect. A second effect was to lead to the cessation of all repair work on our railroads, which induced the canceling of old orders and held back any new work. Simultaneously the frequent failures brought about a very cautious method of operations among large traders. The rapid decline in prices induced buyers all over the country to purchase from hand to mouth, since they were convinced that every successive purchase could be made at lower and lower figures.

The wholesale suspension of work threw out of employment many thousands of men, while the mass of the industrial population had to submit to reductions in wages. Enforced economy reduced consumption of the staples, and the retail trade which was last to feel the effects of the panic began to suffer severely.

The recovery must be along the line traversed in the downward path. One of the troubles which has been at the root of the evil has been cleared away. Money is as plentiful as it ever has been. But it will take a long time before it galvanizes commerce and industry with renewed life. There are elements in the situation which make moneyed men still cautious. It takes time before a capitalist grows tired of having his money unproductive, before the eagerness for better interest overcomes the fear for the safety of the principal. The wage earner who has been forced to draw on his hoard of savings, or has run into debt, does not become a liberal buyer as soon as his

income is restored to its usual amount. In other words, consumption rallies only slowly from the check which it has been subjected to, and that holds true as well for the requirements of great undertakings as for the necessities of the mass of the working people.

A good deal of stress is laid by merchants upon the fact that stocks of all classes of manufactured goods in the hands of the traders and jobbers who are nearest to the consumer are lighter than ever before. It must be conceded that that is an important element in the situation. But it is not likely to have much influence upon prices, so long as the buyers know that there is a very large reserve manufacturing capacity. At the present rate of consumption there must be considerable swelling of trade before manufacturers are sufficiently confident of future orders to hold back for better figures. Another point which aids in retarding recovery is that a period of sinking prices causes buyers to adhere to a policy of purchasing in small amounts and withholding orders as long as possible. It is true that this ultimately creates a very rapid upward movement, which in the past has culminated in historic "booms." There are those who see in the present situation all the elements of such a phenomenal rise, but with the tariff question looming up as a very disturbing factor there is no prospect of any marked advance in any quarter in the near future.

Engineers and Mechanics in the Navy.

Chief Engineer Melville, in his report just issued, again calls attention to the fact that there are not enough engineers in the navy to properly care for the machinery placed in their charge. The efficiency of the members of the engineer corps has never been disputed, but no matter how capable and energetic an engineer may be there is a limit to his physical endurance and he can stand only a certain amount of overwork. That there is danger of serious trouble some day arising from this paucity of numbers has been pointed out in former reports. Spending millions of dollars on a vessel and then compelling a few overworked men to be responsible for its welfare seems to be ridiculous in the extreme; and yet this is the exact condition of affairs in the United States Navy at the present time.

The marine engineer of to-day must be a man of the highest attainments and of unimpeachable character. Natural aptitude, long and close study, quick insight and the ability to do the proper thing at the right time and under the most adverse circumstances are the qualifications needed to fit him for his position. Young men of this stamp are loath to enter the engineer corps, and perhaps the most notable debarring influence is that the engineer is practically without rank.

His position is one of vast responsibility, but it is not recognized. That this evil should be remedied and that, if remedied, the service would be benefited are points brought out in this report. On this subject Chief Engineer Melville says:

Coming to the question of conferring positive rank, instead of the meaningless "relative rank" now held by members of the Engineer Corps, I earnestly trust that the department will recommend to Congress some measures looking toward this just and proper recognition of the service performed by the officers of this corps. Why officers devoting their lives to the service, who have always had a certain portion of the crew to organize, muster, discipline, station and drill in the various maneuvers intended to make the vessel efficient and destructive, and who, from this time on, will have under their control from 25 to 60 per cent. of the entire ship's company, should be denied recognition as a military element in a fighting organization would be incomprehensible to any one not familiar with the inside workings of the navy.

In the naval battle of the future a ship will fight with her engines as well as with her guns; the ram will be a more dangerous weapon and one more feared than the battery, and if her boilers or her engines fail, the vessel will become a drifting mass, absolutely at the mercy of the enemy.

There is a further difficulty in obtaining high grade mechanics, and especially coppersmiths, at the wages paid—\$50 per month. There is much work for the coppersmith and his services are constantly in demand, but this work is now always done on shore. The recompense, so insignificant compared with that to be had on shore, the restraint under which the men are placed and the killing of their ambition because there is no chance for advancement, all tend to keep out men of the right stamp who do not crave the privilege "of sleeping in a hammock" for \$50 a month and "found."

One of the Pittsburgh mills has demanded of the men making application for work that they sign a paper binding themselves not to become members of the Amalgamated Association of Iron and Steel Workers. This course has thoroughly aroused the union men, and has led to a large mass meeting in Pittsburgh, at which vigorous speeches were made and resounding resolutions were passed. We believe that it is a very grave mistake to demand of any man that he make a promise of this kind. The workingmen have a right to organize, and it is far better that they do so openly than that they be forced to secrecy. No man will sign a paper of the kind, under the stress under which the unemployed are during this depression, without making the mental reservation that he is doing it under unfair compulsion. He is simply made to feel mean, a feeling which must rankle and create enmity and trouble later on. Few will blame a workman who breaks a pledge extorted under such circumstances. It is unwise to insist upon an agreement which the employer has no means of enforcing. The Amalgamated Association has become the victim of its

own folly and of developments in the iron trade over which it has no control, although it attempted to resist them. To unnecessarily aid it by investing its members with the glories of martyrdom is a very serious mistake.

Shop Transportation

Recent developments in methods and appliances have brought to the front the importance of adequate means of transportation of materials within the limits of the shop and modern manufactory. The means to be adopted and the relative expenditure advisable must, above all, depend upon whether the goods to be transported are manufactured or built, as those two words are usually understood.

Where manufacturing has become a fine art the transportation facilities may be so specialized as to be capable of handling only specific classes of materials or individual parts of standard machines, either separately or in bulk. But when it becomes a matter of building only one article or machine of a kind, the arrangements must be of such general character as to meet all possible conditions.

Between these two extremes lies the golden mean to be attained in most manufacturing establishments. Special arrangements are almost universally provided for individual machines, but usually as a means of ready handling and for movement through only a short distance, rather than for actual transportation about the plant.

But the mechanism and arrangement which serve to convey a piece from one machine to another, as the process of completion is carried forward, enters most decidedly as a factor in the transportation facilities. Such is the convenient scheme of overhead traveling trolley with switches for individual machines, and even the ancient jib crane swinging the piece from each machine to its neighbor. The introduction of the pneumatic hoist has aided much in the operations of such arrangements.

For moving small pieces in bulk or larger pieces of symmetrical shape the belt or chain conveyor has proved an economical means, while the pneumatic tube still presents ample opportunity for its utilization. The massive traveling crane, developed from the hand trolley, has almost leaped into prominence, and its latest development in connection with the electric motor as a means of propulsion has placed at the command of all a method of transportation from one part of a building to another that cannot be excelled.

The place of the hand truck has been usurped by the modern narrow gauge shop railway, with its switches and turntables, its easy running cars and its ready adaptability to all conditions and arrangements. Whether the motive power shall be human or animal, or whether the work shall be done by steam or electric locomotive, by cable or by electric trolley system must depend upon the weight, character and number of the pieces and the distance they are to be carried.

When the interest and depreciation account upon such appliances is compared with the running expense for manual labor, which would otherwise be necessary, it is surprising to see

what expenditures the manufacturer would be justified in making, and what economies would result from the introduction of improved facilities for transporting his manufactures about the establishment.

CORRESPONDENCE.

The Effects of Cheap Beams.

To the Editor: Referring to the article in your issue of yesterday on "The Effect of Cheap Steel Beams," it would have been more complete if you had added that, as a result of the present low prices of beams, several firms interested in these concerns are in the hands of receivers or assignees, and every beam now made is made at a positive loss to the mills. X.

TRENTON, N. J., October 27.

The Orinoco Iron Mines.

To the Editor: There is so much being said in regard to cheap iron ore from the Mesaba region, and furnacemen east of the Allegheny Mountains are looking for a cheap high grade ore, that I would like to call their attention to the large body of iron ore on the Orinoco River, at Imataca, S. A. This ore is fully as high in iron and as low in phosphorus as the Lake ores, and the following will show what the cost of each ore would be:

Mesaba Ore.

Royalty.....	\$0.50
Freight to Duluth.....	.65
Mining.....	.25
Freight to Buffalo.....	1.20
Freight from Buffalo.....	1.75

Total.....\$4.35

Imataca Ore.

Royalty.....	None
Freight to New York.....	\$1.80
Mining.....	.50
Freight from New York.....	.60
Duty.....	.75

Total.....\$3.65

Yours truly,
"MINING ENGINEER."

OBITUARY.

O. B. NORTH.

Oliver B. North, senior member of the firm of O. B. North & Co., New Haven, Conn., died on Monday, 23d ult. Mr. North had suffered from a severe attack of apoplexy a few days previously, but this attack was merely the culmination of organic troubles to which he had been a victim for years. Mr. North was born in March, 1817, in New Britain, Conn. He was the son of Alvin North of New Britain, and a grandson of James North, the first manufacturer of hardware in Connecticut. The latter and three brothers, Seth J., Henry and James, were all manufacturers of hardware in New Britain. This family of manufacturers were the first to manufacture hooks and eyes for ladies' dresses, and either the first or second concern to make sleigh bells. These hooks and eyes were made by hand, and in 1828 Alvin North invented the first machine for making hooks and eyes. A. North & Son ran the first steam engine in New Britain, and the second in the State. The firm of O. B. North & Co. were formed in 1848 as manufacturers of saddlery and harness hardware in New Britain, Conn. In 1863 the establishment was destroyed by fire, and the firm removed to New Haven. Before leaving New Britain a brother-in-law of Mr. North, Mr. Brace, was admitted as a partner. The firm

have been located in New Haven since that time and have done a successful business. Mr. North was a man of varied information and good judgment in business matters and had many excellent qualities, and appreciative tributes are paid to his worth.

Induced Draft in Marine Boilers.

Some very important results are likely to follow the trials of boilers in the navy during the maneuvers of the past summer, says the *Enquirer*. Many opinions have been expressed concerning the value of the induced draft system as compared with the forced draft system, some engineers holding that there is no ground for comparison, as both systems result in the same thing—namely, a mere difference of pressure between the fire grate and the top of the chimney. However this may be, it is certain that several of the attempts made to stop the destruction of boilers in the navy by means of ferrules of various kinds have only proved to be palliatives, for there are several ships now which cannot be driven at anything like the full power of the engines in consequence of the tender care necessary with the boilers. On the other hand, some of the most recent additions to the navy are reported to do very well, but the experiences with the "Barfleur," the "Barham" and the "Bellona" all point to the necessity for an examination into the causes of perhaps the most unsatisfactory boiler performances ever known. Something of this kind will no doubt result from the experiments, or rather trials, which the Admiralty have now ordered to be made with the "Gossamer," presumably as a result of the report of Commander Rowland E. Berkeley, who commanded the "Gossamer" during the recent maneuvers. As is very well known, it was the duty of all those who commanded the vessels during these maneuvers to report on the behavior of that which is included under the head of machinery. Commander Berkeley's report on the boilers and stoke hold arrangements and performances on the "Gossamer," which is fitted with both the forced draft closed stoke hold and the induced draft open stoke hold, is remarkable for the very strong terms in which he speaks of the superiority in every respect of the boilers worked under the induced draft system. He deals with every leading question, such as steaming capacity, condition of stoke hold, the ability of the stokers to do their work without fatigue, the cleanliness, the coolness—not only in the stoke hold, but of the funnel, while the other funnel was dangerously heated—the working throughout without hitch, and the quickness with which steaming up for increase of speed may be done to order without fear of boiler damage or leaking. On all these points, he says, the induced draft system was so much the superior that there can be no comparison made between the two systems. Now that the induced draft system is at last to be fully tried, we may hope that the information which will be obtained will be made public, for if, as is maintained by some, there is an essential difference between the induced draft of the thick fired successful locomotive boiler and the plenum of the forced draft leaky marine boiler, then we ought to be told why. That there is a difference the Admiralty seem now to be satisfied, for two new ships are specified to be fitted with induced draft.

Manual Training Schools.

At the dedication of the Louisville School of Manual Training, which occurred a short time since in the city named, Prof. C. M. Woodward delivered an address, in the course of which he reviewed at some length the subject of manual training. In the course of his remarks a number of points were touched upon in a way to interest a large number of our readers, and we therefore present copious extracts in this connection. He said that the occasion was one which seemed to demand an exposition of the principles involved in the manual training movement, and he considered it proper, therefore, to speak of the history and character of manual training. In describing its evolution he said:

Manual training, as an educational factor, owed its existence to a widespread conviction that the education of the schools had been dealing too exclusively with the abstract and the remote, and not enough with the concrete and the present. The thought product of the school was too dim and uncertain, and the knowledge gained had no sufficient bearing upon the matters of daily life. Consequently the pupil lacked mental vigor and clearness, and his school experience was deficient in practical elements. Manual training embodies pre-eminently the modern idea of substituting things for words, observation for printed description, and personal experience for the recorded experience of others.

ENGINEERING SCHOOLS.

Schools for civil engineering were established some 50 years ago to train men to build the railroads, bridges and canals that increasing traffic demanded. With the steam engine and its application, not only to commerce, but to every field of labor, came the demand for mechanical engineering. Similarly with the development of electricity, electrical engineering has sprung forth in full stature as a new profession.

All these branches of engineering require as preliminary studies a knowledge of the theory and use of tools, and the methods of precise and scientific construction. This requirement was met by incorporating shop work into the professional courses, as was first done at the Polytechnic, at Worcester, Mass.; at the Massachusetts Institute of Technology, in Boston; at the State University of Illinois, at Washington University in St. Louis, and at other places in a less marked degree. Then came the thought that tool work and drawing should be classed among the preparatory branches with elementary science and mathematics. With this thought came an effort to reduce the teaching of the theory and use of tools to a science. Let me illustrate the evolution of our methods by analogy. There must have been a time when, with a view to economy and better instruction, some one, reflecting upon the various calculations of the accountant, the builder and the financier, discovered that all numerical operations came under four heads—viz., addition, subtraction, multiplication and division. The suggestion was then made that it would save time to teach those fundamental rules carefully and well before attempting to teach their application. Children could be taught to multiply and divide rapidly while too young to appreciate exchange, taxes and mensuration.

In precisely the same way, after ages of failure to comprehend the problem, the fundamental rules of tool work have been discovered and arranged in logical order suited to class or individual instruction. It is now seen that

old systems of apprenticeship, by which one mastered the use of certain tools and acquired a knowledge of a certain trade, was wasteful and narrow to the last degree. Much time and many opportunities for broad culture were thrown away, and only a narrow and one-sided training was secured. To be sure, tools have improved and multiplied and the stock of materials has increased; nevertheless, the fundamental principles once recognized are readily applied.

MANUAL TRAINING.

In manual training, pure and simple, only tools and methods of use are taught. The shop exercises are almost as abstract as in "long division." A mortise and tenon joint typifies nearly everything in joinery—the tenon may be single, double or multiple; it may be plain or dovetailed, or without a pin or wedge. The joint may be blind or open, rectangular or oblique. In its construction, one may use the plane, the try-square, the bevel, the gauge, the saw, the bit, the chisel, the mallet, the knife, the vise, the bench hook; and it may be put together with paint or glue. However, before an elaborate joint can be properly undertaken, the theory and use of each tool, and how it can be put in order and kept so, should be carefully taught and learned by abundant practice. Beyond a few examples, possibly a single example, of synthetic construction for the sake of illustrating the application of general principles, the manual training school need not go. Similar statements can be made in reference to wood turning, wood carving, forging, tempering, molding, pattern making, metal fitting, &c. Almost the only thing a student should be able to show at the end of his training is the discipline, the knowledge and the clear insight he has gained. If he is able to make a merchantable article of any sort—a bureau, a horseshoe, a chisel or a dynamo when he is through school—well and good; there can be no objection, but there would be serious objection to his stopping his studies at school for the purpose of making such articles.

It thus appears that the graduate of the manual training school has acquired no trade, though he is familiar with the underlying principles of many trades; he has earned no money, he has earned no business, he has not even an adequate notion of the practical and educational value of his experienced skill. These latter things are not the fruit of schooling; they come from subsequent experience. As the trained gymnast, has developed every muscle, co-ordinate physical actions, and learned to use his judgment and maintain his self control at all times and in all positions, with no definite idea of how such training will serve him in life, so the broadly and rationally trained user of tools does not know in what emergency he will call to his aid the skill and training he has gained here. Both he and the world have yet to rise to a proper appreciation of the trained intelligence which quickly comprehends the thought of a new mechanical appliance and the force of new conditions. It should now be clear that in every craft, whether lower or higher, there are certain foundation principles, mental and physical, which underlie actual practice, and that it is the province of the manual training school to furnish opportunity for the mastery of these foundation principles, and that its claim to be a school for general education permits it to go no further. Finally, in a single phrase, manual training is that department of general education whereby one acquires the mastery of tools and materials.

HISTORICAL SKETCH.

About the year 1868 Victor Della

Vos, Director of the Imperial Technical School of St. Petersburg, published a report giving for the first time the correct method of tool instruction. In his school three years were spent in training, and three years in actual technical work. His method, which was that of separating instruction from construction, was not made known in this country until the Philadelphia Exposition of 1876. The credit of calling attention to the Russian educational exhibit is due to president John D. Runkle of the Massachusetts Institute of Technology, who made a full report of their method of tool instruction to his Board of Trustees that year. In 1877 President Runkle opened shops for instruction in tool work, on the Russian plan, in the institute. Soon after the School of Mechanic Arts was opened as a sub-department of the institute for the instruction of mechanics not less than 15 years old. It had a two-year course of study, including drawing and English studies. The attendance at the school was never large. It was discontinued two or three years ago.

Meanwhile shop work for the sole purpose of instruction had been introduced into the Polytechnic School of Washington University, St. Louis, as early as 1874. In 1877 three shops were fitted for the complete round of tool work, and classes from preparatory schools were admitted. On the strength of that experience a distinct and separate preparatory school, known as the St. Louis Manual Training School, was opened September 6, 1880. The course of instruction covered three years, and was very broad and general. This school is now in its thirteenth year, with 300 students under the charge of a director and 14 assistants. The immediate and acknowledged success of the St. Louis school led to the establishment of the Chicago Manual Training School by the Commercial Club of that city. The school was opened February 4, 1884. The school has upward of 300 pupils, all seats being occupied. Baltimore opened its Manual Training School March 5, 1884, as a part of the public school system. Including some classes below ordinary high school grade, its enrollment is upward of 500. Manual training was introduced into the High School of Toledo, in Ohio, in December, 1884, and during the following year the Scott Manual Training School was built in connection with the high school building. Under joint management the school is open to both boys and girls as a part of the public school system. Manual training was introduced into the College (high school) of the City of New York, in 1884. The Miller "Manual Labor" School, now very nearly a school for manual training, was established at Crozet, Albemarle county, Va., early in the 80's.

Philadelphia opened its Central Manual Training High School in 1885. The school was soon filled to its utmost, and a second one was opened by the School Board. The last report shows that these schools are crowded with a total enrollment of 576 pupils. The Cincinnati Technical School (really a school for manual training) was opened by a corporation in 1886. Following these schools the growth of manual training has been rapid, and the interest is still increasing. It is impossible to give even an approximate list of the schools established either independently or in connection with existing high schools. Nearly every State agricultural and mechanical college has a manual training department of about the high school grade, conspicuously those of Kansas, Indiana, Pennsylvania, Texas, Arkansas, Mississippi, North Carolina and Ohio.

MANUFACTURING.

Iron and Steel.

Last week the Linden Steel Company of Pittsburgh went out of the hands of the assignee and again took possession of their own business. The change was the result of an order made by the courts discharging the Safe Deposit & Trust Company as assignee. This was caused by an agreement between the firm and their creditors, all of the latter to whom sums exceeding \$100 were due agreeing to an extension. The creditors for \$100 or less were paid in full, their claims aggregating \$2409.14.

Clinton Furnace of the Clinton Iron & Steel Company, at Pittsburgh, has been banked down, owing to a large stock of pig metal being on hand.

Nearly all departments of the Wayne Iron & Steel Works of Brown & Co., Incorporated, at Pittsburgh, were put in operation last week. The puddling department of the firm, which was closed down temporarily owing to the refusal of the puddlers to sign an agreement not to join any labor organization while in the employ of this firm, has also been put in partial operation.

The works of the United States Iron & Tin Plate Mfg. Company, at Demmler, Pa., manufacturers of tin and terne plate, are in full operation, the firm having a very active demand for their various brands of plate. A fact generally known to the trade is that to this concern belongs the distinctive title of being classed as the pioneer manufacturers of tin plate in this country. In 1873 this concern engaged in the manufacture of tin and terne plate at their present location, but of course their plant was considerably smaller at that time than it is to-day. When the change was made in the tariff by which the duty on tin plate was considerably lowered, the company were compelled to abandon its manufacture, and confined themselves exclusively to the production of iron and steel sheets, dripping and bread pans and other goods of a similar nature. The restoration of the duty on tin plate by the passage of the McKinley bill resulted in this firm spending over \$100,000 in the remodeling and enlarging of their plant in order to engage again in an industry which they were compelled to abandon many years before. During the worst period of the business depression their tinning department was kept in constant operation, and nearly all the time to full capacity. This company have published recently a pamphlet giving valuable information to users of tin plate.

Taking effect on November 1, the wages of day laborers in the employ of the Sharon Iron Company, Limited, at Sharon, Pa., were reduced 10 cents per day. The wages of blast furnace employees have also been reduced 10 per cent, taking effect on the same date.

A short time since the Brilliant Iron & Steel Company of Brilliant, Ohio, manufacturers of iron and steel bars and special shapes in iron and steel, had an opportunity to close a contract for puddling which would have given their employees at least two months' work. But owing to the fact that this firm have been paying \$5 per ton for boiling, it was impossible to continue to pay this price and accept the contract. The firm therefore made a proposition to their men, offering to pay \$4 per ton for boiling, stating at the same time that Pittsburgh mills were having their boiling done at this price, and unless their employees would accept the proposition they could not start the plant. The workmen refused to go to work at \$4 per ton and thus the matter stands. We understand the entire plant of this concern is idle for an indefinite period.

The rolling mill of the Chicago Forge & Bolt Company, at Fortieth street and Stewart avenue, Chicago, was leased some time since to Thomas S. Blair, Jr., and E. Protzman of Pittsburgh, who fitted it up to manufacture small steel angles, channels, Z bars and special steel shapes of small size. They operate the mill under the name of the Chicago Rolling Mill Company, with Chas. W. Goodrich & Co., The Rockery, Chicago, as purchasing and sales agents. It is closed at present, but will be started up again as soon as trade revives.

The West End Rolling Mill Company, Limited, of Lebanon, Pa., are running their chain works at their full capacity. They claim that they have enough work ahead

in this department of their plant to last until spring.

The Joliet Steel Works of the Illinois Steel Company have been greatly changed and improved since they were last in operation. The old converters have been replaced by two 10-ton converters, which will cast in molds on a car instead of in a pit, as had heretofore been the practice. This will obviate the necessity of handling the ingots, to load and remove them after the molds are filled. The car will then be drawn out and as soon as the ingots are sufficiently cooled they will be mechanically stripped. Electrical appliances have been introduced in some departments to save labor and increase the efficiency of the machinery. Cold metal will be hauled up an incline and automatically dumped from a skip into the cupola, precisely as ore or coal is hauled. The billet mill has been completely overhauled and remodeled, and a much greater output is assured than before as soon as the new machinery gets to running smoothly and the workmen become accustomed to handling it. The converters and billet mill are the only part of the works to be put in operation at present. The rod mill will not start up until there is a better demand for rods, while the blast furnaces will remain idle until the large stock of pig iron on hand is consumed.

The Ohio Iron & Steel Company, at Lowell, Ohio, announce that they will start their Mary Furnace about November 1. During the past four months' stoppage many improvements have been made and the furnace relined throughout. The company state that it is not from any favorable indications in the outlook that the start is made, but having made a specialty of Mary Ohio Scotch foundry iron for many years, and the supply on hand being about exhausted, they feel called upon to take care of a trade whose demands at present, although limited, are none the less imperative in order to preserve the uniformity of their cupola practice.

Blast furnace No. 1 of the Burden Iron Company, Troy, N. Y., which had been idle five months while being rebuilt, was blown in on the 26th ult. Employment was given to 100 additional men.

The employees of the Birdsboro Nail Works of the E. & G. Brooke Iron Company, at Birdsboro, Pa., have returned to work at a slight reduction in wages.

One of the two blast furnaces of Richard Heckscher & Sons, at Swedeland, Pa., has closed down.

The Ohio Falls Iron Works, New Albany, Ind., have resumed operations in all departments after a shut down lasting two weeks. During the temporary suspension of work a large new fly wheel and two large cog wheels were set up.

The employees at the furnace plant and steel works of the Sharon Iron Company, Limited, Sharon, Pa., have been notified of a reduction in wages of 10 to 15 per cent.

The Salem Iron Company of Pittsburgh have purchased the Grafton blast furnaces at Leetonia, Ohio, from the creditors of Graff, Bennett & Co. At this time one stack is in blast, but if the iron market does not show early improvement it will probably be banked about the first of the year.

The works of the Ellwood Shafting & Tube Company, at Ellwood City, Pa., are now in full operation in all departments, turning out a large product of seamless steel tubing for bicycle and other purposes for which this tubing is particularly adapted.

We are advised that the statement that the Elba Iron Works and the Continental Tube Works, owned by the Oil Well Supply Company, Pittsburgh, would be put in operation at an early date is untrue. At present there is no prospect of either of these mills being started up.

Operations were resumed at the Portage Iron Works, Duncansville, Pa. The management and the employees adjusted their differences and the workmen in the finishing mills accepted an average reduction of 25 per cent. in their wages.

At Muncie, Ind., the Whitely Malleable Iron Works have commenced the work of building a new structure 125 x 50, which, when completed, will be operated as a gray iron works in connection with the present malleable iron works.

The Penn Iron Company, Limited, of Lancaster, Pa., have decided, it is stated, to close their rolling mill and other works on account of lack of orders. The company employ 350 men.

At Muncie, Ind., the White River Iron & Steel Works have started making bar iron and steel, and the Whitely Reaper Works have announced that they will resume operations October 30.

Machinery.

The Lebanon Boiler, Foundry & Machine Company of Lebanon, Pa., successors to I. Pott & Co., are making a specialty of furnace barrows, and are meeting with much encouragement in this line. Their regular line includes boilers, engines, pumps, tanks, stacks, bells, troughs, kettles and stable fittings. They are fitting up a large brick building near their works as a machine shop and expect to have it running very shortly. This will materially increase their capacity.

A new firm, W. J. & W. E. Davison, have commenced business at 226 North Fourth street, Philadelphia, as manufacturers' agents. They will, among other lines, push the sale of Prouty's wire valve wheel.

The Harrisburg Boiler & Mfg. Company of Harrisburg, Pa., have recently shipped a 75 horse-power water tube boiler to the Fayetteville Water Works, Fayetteville, N. C.

Geo. W. Fifield, Lowell, Mass., manufacturer of engine lathes, is erecting a new steel covered shop 250 x 60 feet, with two l's, each 120 x 60 feet. The new building will be connected with the main line of the Boston & Maine Railroad by a side track.

Hereafter all machines made by the Egan Company of Cincinnati, Ohio, builders of wood working machinery, will have placed upon them a number commencing from 50,000 and then onward, so that when repairs are ordered the mere mention of the number of the machine brings forward its pattern and class, for a complete record is made of every machine that goes out.

The cast iron pipe foundries of R. D. Wood & Co., whose headquarters are at 400 Chestnut street, Philadelphia, with foundries at Millville, Florence and Camden, N. J., have been kept running steadily through the summer, the company having experienced practically no dropping off in the volume of trade until the present month. They have, however, shared with competitors the generally prevailing low prices.

The D. E. Whiton Machine Company of New London, Conn., manufacturers of gear cutters, centering machines, lathe and drill chucks, are at present running their plant four days per week, making two-thirds time with about their regular force. They do not regard the immediate outlook for business in their particular lines as very promising.

The Common Sense Engine Works of Muncie, Ind., which went into the hands of receivers some time since, will probably start up at an early date. It is stated that the stockholders and the creditors have compromised their claims, and that under the new arrangement G. Campbell Janney will be president, J. C. Johnson, vice-president, James R. Sprinkle, secretary and treasurer, and Benj. F. Howell, general manager. When running to full capacity the plant employs about 200 men. It is stated that a number of good sized orders are on the books, and it is believed that the works can be successfully operated and placed on a paying basis.

The foundry of William Tod & Co., at Youngstown, Ohio, has closed down on account of lack of orders and the general depression in business. There is a probability also, it is stated, that the machine shop will close down entirely if the present conditions of trade continue.

The Ball & Wood Engine Company of Elizabeth, N. J., whose works have been running only five days a week, have resumed on full time.

The J. I. Case Threshing Machine Company of Racine, Wis., are further increasing their capacity by the erection of a new molding shop. The structure will be in the shape of two l's, 210 x 80 feet and 84 x 80 feet respectively. It will be of brick, with an iron truss roof having a span of 80 feet. Two cupolas, capable of melting 50 tons a day, will be furnished by the Detroit Foundry Equipment Company. There will be seven steel cranes, electrically driven, the same medium furnishing power to run 800 incandescent and 14 arc lights and four motors on the hoisting derrick. In every respect this new department will be in keeping with the model establishment of which it will be a part.

The machine shop of the Anderson Foundry & Machine Works, at Anderson, Ind., has been closed. The foundry and pattern department are still running with only small forces.

The Skinner Chuck Company of New Britain, Conn., have equipped their plant with additional new machinery for the manufacture of their New Model drill chuck and new improved planer chuck and face plate jaws. The company have been awarded patents on two of these, and the slight improvement in business already noted leads them to hope that the demand will soon keep them fully occupied.

The Mechanical Boiler Cleaner Company of Montclair, N. J. have been incorporated, with a capital stock of \$100,000, for the manufacture of a mechanical appliance for cleansing boilers.

The Collins Mfg. Company of San Antonio, Texas, have recently expended about \$10,000 in fitting up a plant for turning out foundry and architectural iron work. Machinery to a like value is still to be purchased.

The plant of the Springfield Emery Wheel Company has been removed from the corner of Howard avenue and Spruce street to the corner of Water street and South avenue, Bridgeport, Conn. The present location is nearer the business center of the city, while the shipping facilities are much better than the old location afforded. The company have had enough business to keep their works going all the time and have several good orders on hand at the present time. They have recently put a new dynamo brush grinder on the market which is meeting with universal approval, while their specialty, emery wheel machinery, is being constantly improved.

The Pond Machine Tool Works of Plainfield, N. J., have reduced their working time to five days per week of eight hours each. Twenty-three men were recently laid off in the foundry department.

When the *personnel* of a concern remains unchanged for 13 years, it is a pretty safe evidence of the fact that harmony has existed and the affairs of the company been successfully managed. Such has been the record of the Waterbury Farrel Foundry & Machine Company of Waterbury, Conn. During the last three or four years the company have laid out \$200,000 in increasing the capacity of their plant. A large foundry has been built and equipped with new cranes and new cupolas, &c.; also a new three-story brick building for making and storing patterns, and an entirely new machine shop erected on the site of the original foundry. A large amount of heavy machinery has been installed, so that the equipment of the plant at the beginning of the year was adequate for employing 350 men, which the company have been doing ten hours a day for six days in the week. With the falling off in business, they have been compelled recently to reduce this number from time to time until only 150 men are now employed. The company have been working on extensive orders for machinery for the Pope Mfg. Company of Hartford, Conn., for use in their new tube works. They have also been turning out special nail machinery for the Capewell Horse Nail Company of Hartford.

The Lane & Bodley Company of Cincinnati, Ohio, are operating their plant nine hours a day with about three-eighths of their usual force of men. While the amount of business transacted is less than usually at this time, the company are seizing the opportunity to make improvements in their products, so as to be ready for the demand which they anticipate will come at an early date.

The Lloyd Booth Company, founders and machinists, of Youngstown, Ohio, have nearly a full force of men at work, and while no very large contracts are on hand it is thought enough small orders will be received to keep their plant in operation to nearly full capacity during the winter months.

The Mahoning Boiler Works of William B. Pollock & Co., at Youngstown, Ohio, have resumed operations in full, and the firm expect to receive sufficient orders to keep running right along.

The Lodge & Davis Machine Tool Company of Cincinnati, Ohio, have recently received a number of orders from the Government for machine tools for the navy yards in Washington, D. C. Also a large order for machinery from Germany, and one from the Big Four Railroad for its machine shops in Bellefontaine, Ohio. The

order from Germany is from a large sewing machine manufactory, employing about 500 hands.

The Westinghouse Electric & Mfg. Company of Pittsburgh have procured a contract for the construction of three 5000 horse-power dynamos for the Cataract Construction Company.

The Vulcain Steam Boiler Works have been incorporated at Albany, N. Y., to manufacture steam boilers, steam engines and general steam machinery in Brooklyn. Capital, \$10,000, and directors, Lucian Knapp of Long Island City; Frank M. Woodruff of Brooklyn and Charles Balloch of New York City.

Later advices from the Cincinnati Milling Machine Company, Cincinnati, are to the effect that they have received a number of good orders, including several from European countries, for their specialties—milling machines and grinders—and that their working force has been increased, while part of their shops are now running 55 hours per week.

The I. & E. Greenwald Company, Cincinnati, Ohio, are running their foundry on two-thirds time, while their machine shops are running full. They report an average amount of orders, some of which, however, were booked previous to the dullness so prevalent. The company report the outlook for the future as being much brighter than for some time past.

The Tudor Boiler Mfg. Company, Cincinnati, Ohio, are operating their establishment on full time on orders, and feel very much encouraged over the prospects for new business.

Hardware.

John Booth, manufacturer of ornamental wire and iron work and successor to the Chicago Wire & Iron Works, 110 Lake street, Chicago, makes a specialty of carrying out the designs of architects in elevator inclosures, heavy wrought iron grilles, fences, railings and guards. He is also manufacturing heavy wire cloth for the use of miners and ore crushers.

At a recent meeting of the creditors of the Youngstown Stamping Company, held in Youngstown, Ohio, who were forced into the hands of a receiver by reason of the failure of Robert L. Walker, an examination of the property was made, and entire satisfaction was expressed at the manner in which operations are being conducted under the supervision of W. C. Hine, receiver. The concern are now filling large orders for oil cans and other of their products for Eastern shipment.

The New York Knife Company, at Walden, N. Y., are building a new fire proof storehouse to be 28 feet in width and 100 feet in length. The side walls will be of brick and the roof of iron, designed and built by the Berlin Iron Bridge Company of East Berlin, Conn., covered with their well known anti-condensation corrugated iron.

Chicago Brass Company, 76 Monroe street, Chicago, with rolling mill and factories at Kenosha, Wis., confine their business to the rolling of sheet metals and the manufacture of organ reeds. They advise us that they notice an encouraging increase in orders during the past few weeks.

Reed & Prince, Worcester, Mass., manufacturers of rivets, burrs and stove bolts, have just completed a new building adjoining their old plant. The addition is built of brick 175 x 40 feet, five stories and an L for engine and boiler rooms. The manufacture of wood screws, a new departure for Reed & Prince, will be begun at once.

Buck Bros., Millbury, Mass., are in receipt of a communication from the Commissioners of Awards at the World's Fair, stating that the firm's exhibit of chisels at the exposition has been awarded a diploma. The firm are at present at work on orders from a number of manual training schools in different sections of the United States. A large order was recently filled for export to Africa. The firm are not running their plant to its full capacity owing to the business depression.

The lawn mower factory of the F. & N. Mfg. Company, Richmond, Ind., started up on the 20th ult. They are running nearly a full force and expect to run steady during the winter.

The Waltham Screw Company, Waltham, Mass., have shut down for an indefinite period.

The plant of the Marlin Arms Company, New Haven, Conn., is now running 54 hours a week instead of 40, as heretofore.

The employees of the Atlas Tack Corporation, Taunton, Mass., suffered a reduction of 30 per cent. in their wages on October 30.

The West Muncie Tack & Novelty Works, Muncie, Ind., was destroyed by fire on the 22d ult. The factory gave employment to about 30 hands. The damage is estimated at \$20,000, on which there is \$3500 insurance.

The Upson & Hart Company, Unionville, Conn., have fitted up their works with the most improved machinery for the manufacture of knives, forks and spoons in nickel, silver and German silver. The production, it is expected, will reach 100 gross per day by July 1. The company refer to their process of manufacturing these goods as reducing the cost materially. Patents on the process have been taken out in England and Germany. H. C. Hart, vice-president and secretary of the company, is the inventor. The company state that they are prepared to treat with parties who are desirous of obtaining a license to manufacture under these patents.

Nicol & Co., 55 West Washington street, Chicago, manufacturers of hardware and other specialties, had an exhibit at the World's Fair of their high art hair tools and curling iron heaters, on which they advise us they have received awards. Ever since the exposition opened they state that they have been selling goods in England, Canada, Australia and South American countries, and they express the opinion that the fair will do them and other manufacturers much good.

Alfred Hess announces under date of November 1 that he has purchased the entire plant of the Union Axle Spring Works, situated at Carthage, Hamilton County, Ohio, and the concern will hereafter be known as the Hess Spring & Axle Company. Mr. Hess refers to his experience of the past 25 years, together with the latest improved machinery, as enabling him to produce goods of excellent quality and finish.

Miscellaneous.

The Allen Electric & Supply Company is the name of a new concern commencing business at 232 Carter street, Philadelphia. They will manufacture trolleys and undertake general repair work. They will also make a specialty of a self oiling bushing.

The Philadelphia Traction Company have placed the order for their new power house with the Berlin Iron Bridge Company of East Berlin, Conn. The side walls will be of brick and the roof will be of iron. The building is 190 feet in width and 168 feet in length, divided into boiler room, engine room and dynamo room.

The Locust Point Iron & Steel Works, Baltimore, Md., who were incorporated in October, 1892, for the manufacture of tin plate, with a capital stock of \$100,000, have been placed in the hands of receivers. The bill of complaint alleges that notes amounting to \$10,000 have recently matured which the company are unable to pay. The works are said to have cost \$150,000, on which there is a mortgage of \$36,000. The inability to make collections is given as the cause for the appointment of receivers.

The Dallas Stamping Company, Dallas, Texas, have suffered a loss of \$10,000 by fire.

The Great Northern shops at Hillyard, near Spokane, Wash., are nearly completed, and will be in operation, it is expected, by the middle of this month.

The employees of the Calumet & Hecla Mining Company in Michigan have been notified of a reduction in wages of 10 per cent. to take effect November 1.

MANUAL TRAINING is about to be introduced into the public schools of Brooklyn, a sum of \$10,000 having been appropriated to this object by the Board of Education. This will defray the expenses of the first experiment in this direction, which will be in the shape of a manual school to be established in the Boys' High School, where the rudimentary principles of several trades will be taught to lads recommended by the principals of the schools.

TRADE REPORT

The West, which has been the leader in the decline during the greater part of this year, seems destined to take the first steps toward improvement. The low prices made have evidently attracted a good deal of business from outside quarters, and the result is that the volume of orders has increased. Thus far this has not resulted in any hardening of prices, but has had only a negative effect in stopping a further giving way.

Foundry and Forge Pig in all markets are still very dull, but there are indications that a little more work is in sight. Within the next week contracts will be let for 9000 tons of Cast Iron Pipe at Philadelphia, and for 6000 tons at Waterbury. To judge from recent sales, prices promise to be low. A small lot was sold in New York recently at \$19.40, delivered in the streets, and in Detroit low prices were also made. We understand, also, that about a dozen city pumping plants are being bid on, the aggregate value being about \$500,000.

Sales of Steel Billets have been made during the past week at figures netting \$17.30 at mill, the buyer being unable to get near the lower prices which rumor claimed as current. In fact, some of the Pittsburgh mills decline to do better than \$18. Against this is the fact that the Joliet mill will soon start, and thus restrict the territory of the Pittsburgh works.

The prospect of considerably lower prices on Steel Rails is discussed with some interest. If it should stimulate buying and thus increase largely the consumption of Bessemer Pig, the whole line of Steel products might be favorably affected. During its existence the Steel Rail Association has always been looked upon as adversely influencing Steel Billets.

Chicago records the fact that sales of Bars have been made in that market as low as 1.35¢, delivered, the lowest on record, from which the price has recovered a little since. Some buyers argue that as yet the rolling mills have not given away the whole of the decline in raw material, Steel Billets and Scrap and in wages, and that, therefore, there is still room below. While this may be true so far as the nominal published quotations are concerned, it is not the fact where the private terms granted for good specifications are taken as the basis. In some markets there has not been any business likely to bring out such figures.

In Structural work Pittsburgh has again captured the latest building in Philadelphia. In Chicago there is some good work coming out, but otherwise the markets are very bare and the outlook is still gloomy.

From the sale of American craft to Brazil it is inferred that the vessels will be replaced by others and thus give our shipyards some badly needed work.

How changed the financial situation is, is shown by an incident which happened to-day. A firm received two checks from iron manufacturers, both anticipating payment by deducting 23 and 51 days' interest respectively.

Philadelphia.

Office of *The Iron Age*, 220 South Fourth St.,
PHILADELPHIA, Pa., October 31, 1893.

The situation shows very little change from last week. Billets are 50¢ dearer, but with that exception anything and everything can be bought at last week's prices, and for an extra sized lot or prompt cash settlement it may be possible to do a little better than that. There is no snap to the market, and so far as regards mills and furnaces in this vicinity there is no increase to the amount of business on hand, the week's deliveries being about equal to the week's new engagements. There is a somewhat better feeling, however, due to the reports from Washington and from the West, but at this late season it is doubtful if it will stimulate the demand, without which it is useless to expect better prices. Careful inquiry among consumers fails to reveal anything likely to improve the situation, those running fullest being on about half or three-quarters time, while in the majority of cases a considerable proportion of the capacity is doing little or nothing. Low prices seem to be no inducement whatever, the general reply being, "It is not a question of price; we will buy what we cannot do without, but low prices are no inducement for anything we do not need." This represents the situation all the way through, and explains an apathy which is almost without precedent.

Pig Iron.—Notwithstanding extremely low prices, and a surprisingly small production compared with that during the past three or four years, there is plenty of Iron, and decidedly more pressure to sell than there is to buy. This condition of affairs cannot last very much longer, but all the same it is as hard to move buyers as ever it was. Prices are not quotably lower, but they are irregular, and in spots easier, particularly when there is a pressure to realize, or when spot cash or something near to it seems to be in sight. Everybody recognizes the fact that prices cannot go any lower, but on the other hand there are no indications of an upward movement, and until something occurs to force an advance, buyers are likely to remain stolid and immovable. The chances are that something of that kind will happen before long, as the drop from a supply of 180,000 tons per week to less than 80,000 tons is too great to meet the consumptive requirements for any length of time, and as soon as indications of scarcity begin to crop up it will probably set people thinking. Meanwhile, however, business is mostly in small lots at prices varying from \$13.75 to \$14.25, delivered, for No. 1 Foundry, \$13 to \$13.50 for No. 2, and \$12 to \$12.50 for Standard Mill Irons, and for Southern No. 3 as low as \$11.25 @ \$11.50 has been accepted. It is difficult to give exact quotations, as a good deal depends on brand, quantity, terms of payment, &c.

Steel Rails.—Prices are down to \$27, but there is not much demand, and it is doubtful if the year's deliveries will reach 1,000,000 tons. There is no inquiry for large lots, so that prices will probably remain at \$27 until there is a class of business worth considering at a lower figure.

Steel Billets.—There is a firmer tone to the market for Billets, but only a small demand, as consumers are not using anything near to their usual quantity. Sales have been made at \$20.75,

delivered, for 500 and 1000 ton lots, and this is now said to be an inside figure. It is not unlikely that prices will remain firm, although with such a large falling off in consumption it will be difficult to secure an additional advance unless there is a sympathetic movement along the entire line.

Finished Material.—All that can be fairly said is that the market holds its own. There is certainly no improvement, and no business of sufficient amount to cause improvement, nor is there likely to be until after the turn of the year, if then. Large work is not coming out to any extent, without which it is impossible to get up any semblance of activity. The current demand for small lots is pretty fair, but as that comprises about all the new business there is mills are not getting themselves into any better shape than they have been in for some weeks past. Prices under such conditions are naturally weak and unsatisfactory, and while nominal quotations are about as follows very much better terms can be had on good sized lots, particularly for good deliveries and a certainty of prompt settlements:

Grooved Skelp, delivered.	1.47½¢	@	1.50¢
Best Refined Bars.....	1.52½¢	@	1.55¢
At interior points.....	1.40¢	@	1.50¢
Tank Steel.....	1.60¢	@	1.65¢
Heavy Plates.....	1.65¢	@	1.70¢
Shell.....	1.75¢	@	1.85¢
Flange.....	2.00¢	@	2.20¢

Old Material.—There is no material change in this department. Holders appear to be unwilling to do business at the low figures usually offered; but the demand is so much out of proportion to the supply that it is difficult to find good buyers unless by making more or less of a reduction from the asking rates, which are about as follows:

No. 1 Wrought Scrap, delivered.....	\$12.00	@	\$13.00
Machinery Cast, delivered.....	10.00	@	11.00
Heavy Steel Scrap, delivered.....	12.00	@	13.00
Old Iron Rails, delivered.....	14.00	@	14.50
Old Street Rails, delivered.....	16.00	@	17.00
Wrought Turnings, delivered.....	10.00	@	11.00
Cast Borings, delivered.....	6.00	@	7.00
No. 2 Light Scrap.....	6.00	@	7.00

Cincinnati.

(By Telegraph.)

Office of *The Iron Age*, Fifth and Main Sts.,
CINCINNATI, November 1, 1893.

While there was little, if any, increase in the volume of business in Pig Iron during the week, there is certainly a more confident undertone to the market at the close, because there is more inquiry for forward delivery and less disposition on the part of furnaces to accept orders for delivery after January except at an advance. Gray Forge can yet be bought at \$7, f.o.b. Birmingham, to a moderate extent for this year, but the furnaces ask an advance of 25¢ per ton for the first half of next year, but no transactions have been made public. There has been rather more than the usual run of consumptive orders in this district during the week and there have been fairly liberal orders from the East for these times, although they are far short of what they would be in a normal condition of the trade. The Iron Pipe works continue to be the largest melters of Iron, and but for them there would have been in the recent past a nearer approach to stagnation in the trade. The repeal of the Silver Purchase law is hailed as the beginning of recuperation in the Iron

trade, but not time enough has elapsed for its effect to make much impression. Collections have decidedly improved and now there is little complaint of backwardness except on the part of chronic lame ducks. Quotations are as follows:

Foundry.

Southern Coke, No. 1.....	\$12.75 @ \$13.00
Southern Coke No. 2.....	10.75 @ 11.00
Southern Coke No. 3.....	10.25 @ 10.50
Ohio Soft Stone Coal, No. 1.....	15.50 @ 16.00
Ohio Soft Stone Coal, No. 2.....	14.50 @ 14.75
Lake Superior Coke No. 1.....	15.00 @ 15.25
Lake Superior Coke No. 2.....	14.00 @ 14.25
Hanging Rock Charcoal, No. 1.....	18.50 @ 19.00
Hanging Rock Charcoal, No. 2.....	17.50 @ 18.00
Tennessee Charcoal, No. 1.....	14.00 @ 14.25
Tennessee Charcoal, No. 2.....	13.00 @ 13.25

Car Wheel and Malleable Irons.

Standard Southern Car Wheel	17.75 @ 18.00
Lake Superior Car Wheel and Malleable.....	17.00 @ 17.25

Forge.

Gray Forge.....	9.75 @ 10.00
Mottled Coke.....	9.50 @ 9.75

Pittsburgh.

(By Mail.)

Office of *The Iron Age*, Hamilton Building, }
PITTSBURGH, October 31, 1893. }

While it is a bold statement to make just now, and may be received with some doubt, it can be truthfully stated that for the first time in many weeks the condition of the Iron and Steel trades is commencing to show some signs of betterment. This improvement, it should be stated, does not apply to prices, but to volume of business now going and to the outlook for the near future. In the first place, the repeal of the purchase clause of the Sherman act will undoubtedly have a good effect on finances and will give a stability to business that has been sadly lacking for some time. In the second place, personal investigation shows that there is a heavier volume of business offering and this applies all along the line of Raw and Finished Material. Commencing with Pig Iron we can state there is more actual buying being done and more inquiries are coming in from buyers than at any time within the past three or four months. Steel is in considerably better demand, the tonnage for the week being the heaviest for some time past. Going right through the entire list of Finished Material there is more or less business doing, some lines of course making a better showing than others. It would also seem that the conviction is becoming stronger among buyers that the level of low prices has about been reached, and that there is no risk in buying for future wants at prices now ruling. The fact is fully recognized by buyers, or should be, that the period of severe depression through which we have gone, and which made it necessary for mills to practically allow customers to make prices, must come to an end some time, and when trade again resumes its normal condition there is bound to be a recovery in values sufficient to allow a fair legitimate profit to the producer. Indications are already present which show it to be possible for this recovery to set in at no distant date.

Pig Iron.—During the week inquiries were more plentiful, with the result that a fair amount of Iron has changed hands since our last report. The increased activity in the Steel market has resulted in a heavier demand for Bessemer Pig, and several fairly large sales have been made within the last few days. There is also a little more doing in Gray Forge, but prices

show no signs of improvement. One or two additional Edgar Thomson stacks have been started, and it is stated that the entire equipment of nine furnaces will be running before this month is out. It is also likely that the Monongahela Furnace Company will put their second stack on Bessemer within a week or so to make stock for the new Steel plant. We quote as follows:

Neutral Gray Forge...	\$10.50 @ \$10.75	cash
All-Ore Mill.....	10.75 @ 11.00	"
Bessemer Pig.....	11.25 @ 11.50	"
No. 1 Foundry.....	12.50 @ 13.00	"
No. 2 Foundry.....	11.50 @ 12.00	"

We note a sale of 2000 tons of Bessemer at \$11.25, Pittsburgh, for balance of the year delivery. Also one of 500 tons of Gray Forge at \$10.75, Pittsburgh.

Billets.—There is a fairly large amount of Steel selling, and the disposition among makers to turn down business offered them at prices below their ideas of the market is becoming more pronounced. We are advised of quite a number of fair sized orders placed within the past week, and the promptness with which buyers accepted prices named by makers was a pleasing revelation and would seem to indicate that the downward tendency of the market has been checked, and also that buyers are becoming impressed with the idea that now is a good time to enter the market. In addition to the sales referred to above, some Eastern buyers are said to be in the market for considerable Steel. The local plants are in full operation and all have a fair amount of orders booked. Prices continue to range from \$17.60 to \$17.75, according to size of order and terms of delivery. It is not believed that \$17.50 would be shaded, however desirable the order. We note a sale of 500 tons for early delivery at \$17.75 at maker's mill.

Plates.—Competition for business is as keen as ever, and prices have been shoved a peg lower. There is only a moderate volume of business, and there is nothing to indicate that it will be heavier in the near future. We quote as follows: Tank, 1.40¢ @ 1.50¢; Shell, 1.60¢ @ 1.70¢; Flange, 1.65¢ @ 1.75¢; Fire Box, medium quality, 2.50¢ @ 3¢; best quality, 3.50¢ @ 4¢.

Structural Material.—The approaching close of the building season is having its effect, and business has recently fallen off perceptibly. Bridge work is also slow, although there are some old orders yet to fill. Should we be favored with a return to prosperity when the building season opens next year it is certain that there will be a very heavy demand for Structural Material, owing to its very low cost. We quote as follows: Beams up to 15 inches, 1.50¢ @ 1.60¢, according to order. Angles and Universal Plates, 1.60¢ @ 1.65¢; Tees, 1.75¢.

Rails.—Makers claim that the combination price of \$29 at mills is still in force. As against this we have reliable information that this price has been shaded very materially on some recent sales. The local mill continues in operation, though not to full capacity.

Ferromanganese.—We continue to quote nominally at \$55 for 80 % domestic. An order placed on the market just now would shade this price.

Muck Bars.—We are advised of a sale of 500 tons for November delivery at \$20.50, delivered at buyer's mill. This may be considered the ruling price in this market. Very little Muck Bar has been sold here for some time.

Wire Rods.—The market continues fairly active, there being but few prompt Rods to be had. For delivery during the next two or three months \$25.50 at maker's mill would be accepted.

Bars.—There is only a fair amount of business offering, and with the mills all desirous of running as full as possible there is naturally very severe competition and prices are somewhat lower. We quote Soft Steel Bars at 1.30¢ @ 1.35¢, with Bar Iron extras. Refined Iron Bars are held at about 1.40¢ at mill, half extras.

Merchant Steel.—There is nothing new to report. Trade is only fairly satisfactory, some of the mills having considerable business while others have very little. Prices are ruling about as follows: Open Hearth Spring Steel, 1.90¢ @ 2¢; Bessemer Machinery, 1.65¢ @ 1.75¢; Toe Calk, 1.90¢ @ 2¢; Tool Steel from 5¼¢ upward, according to quality.

Wire Nails.—The active condition of the market referred to in our last report continues. Prices, however, show no improvement, but on the contrary have shown a weaker tendency. While we quote at \$1.25 in carload lots at mill, it can be stated that this price is being shaded to some extent. In the Cut Nail market there is nothing new to report. Mills in the Wheeling district have a fair amount of orders on their books, but could take care of considerable additional business if offered. The market is represented by the quotation \$1 @ \$1.05 at maker's mill for the usual averages.

Barb Wire.—There has been no improvement in demand and the present condition of this industry is unsatisfactory. While we continue to quote \$2.25 for Four-Point Galvanized in carload lots, it should be noted that some recent transactions were at a slightly lower figure. We continue to quote Painted at \$1.85 in carload lots, but this price is also shaded.

Connellsville Coke.—For the week ending Saturday, October 21, there were 5454 ovens in the Connellsville region in blast and 12,006 idle, with a total estimated production for the week of 48,435 tons. We can report a better demand for Foundry Coke, and prices are being maintained on the basis of \$1.50 to dealers and \$1.65 to consumers. Coke makers expect an early improvement in the demand for Furnace Coke, and it is the impression that higher prices will prevail on the opening of the new year. We continue to quote Furnace Coke at \$1.10 in tons of 2000 pounds, f.o.b. cars in Connellsville region.

St. Louis.

(By Telegraph.)

Office of *The Iron Age*,
Bank of Commerce Building,
ST. LOUIS, November 1, 1893. }

Pig Iron.—Reports of low prices are not now so frequently heard, and the impression gains ground daily that the bottom at last has been reached. We have had occasion to make this remark before, when Iron was higher, and this prediction may prove erroneous, like its predecessors, but the fact remains that statistically the market was never in better shape to respond to an increased trade, and it seems unreasonable to assume that furnaces will continue to sell at prices which they claim

net them an absolute loss. Sales during the week are about on a par with preceding weeks, and prices are practically unchanged. We quote as follows for cash, f.o.b. cars St. Louis :

Southern Coke, No. 1 Foundry	\$13.25 @ \$13.50
Southern Coke, No. 2 Foundry	11.50 @ 11.75
Southern Coke, No. 3 Foundry	10.75 @ 10.95
Southern Gray Forge	10.25 @ 11.50
Southern Car Wheel	17.25 @ 18.25
Lake Superior Car Wheel ..	16.50 @ 17.00
Ohio Softeners	16.00 @ 16.50

Bar Iron—Local jobbers report a better demand both from the city and country trade. Prices for lots from store are a trifle higher and are now quoted at 1.70¢ @ 1.75¢. Mills quote 1.45¢, half extras, f.o.b. East St. Louis.

Barb Wire.—The scarcity of Rods has prevented mills from shipping promptly, and they are now pushed to fill their orders. Texas freight rates are again lower and some large shipments are made into that section. Prices are fairly firm, as follows: Mills quote Painted at \$2, terms 60 days or 2% discount for cash. Jobbers ask \$2.10 for Painted and \$2.45 for Galvanized.

Wire Nails.—The weakness noted in our last report continues and \$1.40 in carload lots to jobbers is now freely made. Indeed, rumors are afloat of \$1.35 and even \$1.30 for lots of from 2000 to 3000 kegs, net cash. Jobbers quote \$1.50 @ \$1.55, according to quantity.

Rails and Track Supplies.—A slight improvement is noted in this department, particularly for Track Supplies. Steel Rails are inactive at \$30 @ \$31. Splice Bars, Spikes, Bolts, same as last reported. Old Iron Rails dull at \$15.

Pig Lead.—This metal is up one day and down the next, so much so that it is almost impossible to keep track of it. Since our last report sales were made at 3.35¢, but offerings are now made for November and December delivery at 3.15¢, with a possibility of 3¢ before the week is out.

Spelter.—No change to report. We continue to quote 3.30¢, but nothing doing at this price.

Chicago.

(By Telegraph.)

Office of *The Iron Age*, 59 Dearborn street, }
CHICAGO, November 1, 1898. }

There is a distinctly better feeling in several branches of the Iron trade, and the opinion is quite general that a recovery in business will be experienced within the coming 90 days. Inquiries are much better, and in a few instances there is a perceptible hardening in prices.

Pig Iron.—In this branch there is no improvement to be noted. The only line in which there has been an increased business is in Lake Superior Charcoal. It is believed that within the past two or three weeks a considerable quantity of Charcoal Iron has been placed with large consumers at low prices. The only transactions which have come to light are two of 1000 tons each for delivery in this vicinity at about \$15.25, on which the terms of payment run until the middle of next summer, although the Iron is to be delivered immediately. Coke Iron is quiet, only one sale of any size being reported, which was 500 tons of Soft

Southern. Even the carload business is not any more active than it has been. Inquiries are light. Quotations are now as follows for cash :

Lake Superior Charcoal	\$15.25 @ \$16.00
Local Coke Foundry, No. 1 ..	13.50 @ 14.00
Local Coke Foundry, No. 2 ..	12.75 @ 13.00
Local Coke Foundry, No. 3 ..	12.25 @ 12.75
Local Scotch	14.00 @ 14.50
Ohio Strong Softeners No. 1 ..	15.50 @ 16.00
Southern Silvery, No. 1	@ 14.50
Southern Silvery, No. 2	@ 14.00
Southern Coke, No. 2	12.10 @ 12.35
Southern Coke, No. 3	11.35 @ 11.60
Southern, No. 1, Soft	12.10 @ 12.35
Southern, No. 2, Soft	11.35 @ 11.60
Southern Gray Forge	10.85 @ 11.10
Tennessee Charcoal, No. 1 ..	16.00 @ 16.50
Alabama Car Wheel	18.50 @ 18.75
Jackson County Silvery	16.50 @ 17.00
Other Ohio Silvery	15.00 @ 15.50

Bars.—The lowest level in this depression seems to have been struck last week when Bar Iron was sold here at 1.35¢, half extras. Since then the market has hardened and the lowest price now quoted on local brands is 1.40¢. The valley mills are standing at 1.45¢, Chicago, and from present indications that quotation will soon be the market rate. Large season contracts are still making their appearance from time to time, and one of this class was closed during the past week at better figures than such contracts realized early in the fall. Inquiries are increasing from the general class of consumers, and carload sales are more frequent than they have been. The local mills are well supplied with business for at least two weeks, which is quite an improvement in their condition. Soft Steel Bars are quoted by most sellers at 1.52½¢ @ 1.55¢, Chicago, and transactions in this line, as well as in Bar Iron, seem to be on the increase. Jobbers report a continued good movement from stock, their best customers still being the Agricultural Implement manufacturers. Store prices remain at 1.60¢ @ 1.70¢ on Bar Iron and 1.65¢ @ 1.70¢ on Soft Steel.

Structural Material.—Revised bids are being received on the Calumet Club Building and specifications are out for a new seven-story hotel. Outside of this there are no large buildings in sight. The demand for Shapes is a little larger from the bridge works, who seem to be in the possession of more orders than for some time. Quotations are maintained at the following prices on mill shipments, Chicago delivery: Beams, 1.75¢ @ 1.90¢; Tees, 1.95¢ @ 2.05¢; Angles and Universal Plates, 1.75¢ @ 1.80¢.

Plates.—Inquiries are very light, but dealers are adding to their stock in anticipation of a much better trade during the winter. At present they report only a light demand from stock. Mill shipments, Chicago delivery, are now quoted as follows: Tank Steel, 1.70¢ @ 1.80¢; Shell Steel, 2¢ @ 2.10¢; Flange Steel, 2.10¢ @ 2.20¢; Fire Box, 2.75¢ @ 5.50¢. Store prices now prevail as follows: Iron or Steel Sheets, Nos. 10 to 14, 2.25¢ @ 2.40¢; Tank Steel, 2 10¢ @ 2.20¢; Shell Steel, 2.20¢ @ 2.40¢; Flange Steel, 2.50¢ @ 2.65¢; Boiler Tubes, 70 %.

Sheets.—The labor troubles in the Sheet mills are interfering with deliveries on contracts and jobbers find much difficulties in supplying their customers. Some of them have just about caught up with sales made during the summer for September delivery. Mill prices show no improvement, but continue to be quoted at 2.75¢, Chicago, for No. 27. Common prices from stock, however, are firmer, and small lots are now held at 3¢. Galvanized Iron is in about the same condition as Black Sheets, with

deliveries from mills considerably behind the orders. Juniata Galvanized is still quoted at 75 % off for mill shipment, freight added. Copper Sheets unchanged at 35 % off.

Merchant Steel.—New business continues to come in steadily in moderate quantities, but specifications on contracts are discouragingly slow. Large Steel consumers are of the opinion that there will be a shortage of Steel in January, by which time they expect that the agricultural works will all be in full operation and all trying to get deliveries from the mills at the same time. More sales have been made of Steel Billets at \$20. The demand in this direction looks very favorable. Mill shipments, Chicago delivery, are quoted as follows: Smooth Finished Machinery, Tire and Open Hearth Spring Steel at 1.90¢ @ 2¢; Ordinary Bessemer Machinery, 1.60¢ @ 1.65¢; Ordinary Bessemer Tire, 1.55¢ @ 1.60¢; Ordinary Tool Steel, 6¢ @ 7¢; Specials, 12¢ and upward.

Rails and Track Supplies.—Steel Rail manufacturers report calls for small lots only of a few hundred tons, which they were able to supply from stock on hand. A considerable proportion of such orders is for Light Rails running down to 30 lb. Standard sizes are unchanged at \$30 @ \$32; Light Rails to 30 lb, \$31.50 @ \$32; 12 lb and upward, \$34.50; Iron and Steel Splice Bars, 1.50¢ @ 1.55¢; Spikes, 1.85¢ @ 1.90¢.

Old Rails and Car Wheels.—Negotiations are pending for several lots of Old Iron Rails, but no sales have transpired; in the meantime quotations are continued at \$14. Considerable more business has occurred in Old Steel Rails, which are quoted at \$10 for long lengths and \$7.50 @ \$8 for short pieces. Old Car Wheels are neglected, with holders asking \$13 @ \$13.50 for carload lots.

Scrap.—Old Material is moving much better than at any time since June. Every kind of Scrap is in some demand except Steel. Old Rubber is in active demand with advancing prices. Shipments of Iron and Steel Scrap are coming in more freely from the country. Holders are getting anxious to realize and in some cases are selling for but a little more than they are obliged to pay for freight. Dealers' selling prices, net ten, are as follows: No. 1 Forge, \$10; No. 1 Mill, \$8; Sheet Iron, \$4.50; Pipes and Flues, \$8; Axles, \$16; Horseshoes, \$11; Fish Plates, \$13; Spikes and Bolts, \$10; Cast Borings, \$4.50; Wrought Turnings, \$6.50; Axle Turnings, \$8; Heavy Cast, \$9.50; Stove Plate, \$7.75; Malleable Cast, \$8; Mixed Steel, \$7, gross ton; Leaf Steel, \$14.50. An error was made in Axle quotations last week which was so apparent that a correction is hardly necessary.

Metals.—Carload lots of Lake Copper are unchanged at 10½¢ and casting brands 9½¢, with very little doing. Consumers of Pig Lead are coming in to some extent and quotations have been advanced to 3.30¢ on large lots and 3.35¢ on single carloads. Spelter seems to be a little firmer and is quoted at 3.45¢.

Samuel Yahres, for some time connected with the Sharon Steel Casting Company, Sharon, Pa., has been elected secretary and treasurer of the Pneumatic Hammer Company of Chicago.

New York.

Office of *The Iron Age*, 96-102 Reade street,
New York, November 1, 1893.

Pig Iron.—Current business is light and the market is without any strengthening tendency. The last sales of Charcoal Warrant Iron, covering 200 tons, went at a shade over \$9, buyer to pay storage, which makes it equivalent to about \$10. The previous sales at \$3 and \$1 were made in the absence of any members of the Iron trade at the Real Estate Exchange. Arrangements have now been made to conduct such sales at the Metal Exchange. We quote Northern brands \$14 @ \$15 for No. 1; \$13 @ \$14.25 for No. 2; \$12.25 @ \$12.50 for Gray Forge at tidewater. Southern Iron, same delivery, \$13.25 @ \$14.25 for No. 1; \$12.25 @ \$13.25 for No. 2; \$11.50 @ \$12.25 for No. 3; \$11.75 @ \$12.25 for No. 2 Soft, and \$12.25 @ \$12.50 for No. 1 Soft. Gray Forge is \$11.25 @ \$12.

Spiegeleisen and Ferromanganese.—No business of any consequence has transpired. We quote: Foreign Spiegeleisen, nominally, for 10 % @ 12 %, \$21.50 @ \$22, and 20 % \$25.50 @ \$26, on cars, Jersey City, and Ferromanganese, \$55 50 @ \$56.

Billets and Rods.—There have been sales of round lots of Billets by Western works to Eastern mills, several thousand tons of special and common Billets being involved. The terms were private, but were not as low as some of the rumors have made them. Open Hearth Billets have sold down to \$23.75 at Western mill. Small lots of foreign Special Steel have also been asked for. We quote nominally: Domestic Billets, \$20.25 @ \$22.50, and foreign Billets, \$23 @ \$28.50, tidewater; domestic Wire Rods, \$28.25 @ \$29, and foreign Rods, \$39.50 @ \$40, tidewater.

Steel Rails.—There is a growing uneasiness in the Rail trade, and indications seem to substantiate the claims that lower prices have been made at other points. In this market no sales have yet taken place to test the matter thoroughly. There is reason to believe that distant mills are making efforts to find customers in the markets tributary to the Eastern mills. The situation will probably be cleared up at an early date.

Track Material.—Small lots are selling at the following prices: Spikes, 1.80¢ @ 1.90¢; Fish Plates, 1.40¢ @ 1.60¢; Track Bolts, Square Nuts, 2.25¢ @ 2.40¢, and Hexagon Nuts, 2.40¢ @ 2.50¢, delivered. Concessions would be made for round lots.

Manufactured Iron and Steel.—The work for the Paterson City Hall has been placed, going to the mills in that locality. There has been no relief from the paucity of orders, so that current values have not been tested for some time by any specifications of consequence. As yet the prices for finished material do not appear to have followed the recent heavy decline in raw Steel. We quote nominally: Beams up to 15 inch, 1.75¢ @ 2¢; 20-inch, 2¢ @ 2.25¢, for round lots; Angles, 1.75¢ @ 1.90¢; Universal Mill Plates, 1.65¢ @ 1.90¢; Tees, 2¢ @ 2.15¢; Channels, 1.80¢ @ 2¢, on dock. Steel Plates are 1.60¢ @ 1.70¢ for Tank; 1.75¢ @ 1.90¢ for Shell; 2¢ @ 2.15¢ for Flange, and 2.50¢ @ 2.80¢ for Fire Box, on dock; Refined Bars are 1.50¢ @ 1.9¢, on dock, and Common, 1.40¢ @ 1.50¢; Soft Steel

Bars are 1.50¢ @ 1.70¢; Scrap Axles are quotable at 1.70¢ @ 2¢, delivered; Steel Axles, 1.70¢ @ 1.90¢, and Links and Pins, 1.70¢ @ 1.80¢; Steel Hoops, 1.75¢ @ 1.90¢, delivered; Cotton Ties, 70¢ @ 72½¢ @ 45 lb bundle, at mill.

Old Material.—Old Iron Rails are nominally at \$13 @ \$14; Old Steel Rails, \$8 @ \$9, and Wrought Scrap \$9 @ \$11.

British Iron and Metal Markets.

[Special Cable Dispatch to *The Iron Age*.]

LONDON, WEDNESDAY, November 1, 1893.

Pig Tin prices have dropped about £2 7s ton during the week, prompts selling at as low as £76. 10/ on Tuesday. On the decline there has been only moderate trading in prompts, but transactions in three months' futures were quite heavy, reaching a total of several hundred tons. The sales were chiefly by operators who became alarmed over the decline in silver, unfavorable advices from the American market and very heavy shipments from the Straits. At the close the market was rather quiet; sales at £76. 17/6 for prompts and £77. 10/ for three months' futures.

Copper has averaged somewhat higher. Merchant Bars for prompt delivery sold up to £42. 15/ under the influence of better advices from America, but upon dealers taking profits there was a reaction to £42. 6/3. From the latter point there was some recovery, due chiefly to purchases for American account. Outside speculative interest is quiet and confined to moderate ventures in futures. Prices at the close were £42 @ £42. 2/6 for Merchant Bars, prompt delivery, £42. 10/ @ £42. 12/6 for three months' futures, and £46 for Best Selected English.

Tin Plate prices are still rather irregular, and some business has been done at 3 pence decline from late quotations. Demand is chiefly for moderate quantities of ordinary Cokes, and for special sizes. Stocks at Swansea have increased somewhat and are now estimated at 236,000 boxes. Liverpool quotations are as follows:

IC Charcoal, Alloway grade.....	12/9 @ 13/3
IC Bessemer Steel, Coke finish.....	11/6 @ 11/9
IC Siemens.....	11/9 @ 12/
IC Coke, B. V. grade, 14 x 20.....	11/6 @ 11/9
Charcoal Terne, Dean grade.....	11/3 @ 11/6

Pig Lead has remained stationary in price, and the market is slow, with sellers at £9. 12/6 for Soft Spanish.

Spelter has met with slow sale, and the market is unchanged at £16. 15/ for ordinary Silesian.

In the various branches of the Iron and Steel trade business has continued slow, and prices, while rather weak, show no radical change. Last dealings in warrants were at 42/2 @ 42/3 for Scotch, 34/6 for Cleveland, and 44/6 for Hematite.

The furnace of the Tonawanda Iron & Steel Company, at Tonawanda, N. Y., will go into blast on the 18th inst.

Metal Market.

Copper.—Home consumers have purchased moderate quantities of Ingot through local sales agents and brokers, the aggregate of which, while problematical, seems to have been sufficient, in connection with exports on previous orders and on consignment, to prevent really burdensome accumulation of stock in first hands. The movement has sufficed to steady values a trifle. Further than that, however, it has had no particular influence aside from holding speculative offers of futures in check for the time being, since all indications are that there will be quite enough Copper to go around during the balance of the year. Lake Superior was offered in some quarters at 9½¢, although the leading producers quote ¼¢ @ ½¢ above that price. On Electrolytic the range is 9¼¢ @ 9½¢, and common casting stock is 9½¢ @ 9¾¢, according to brand, delivery, &c.

Pig Tin—In the price of Straits Tin there has been a decline during the past week of about ¼¢ 7s lb. Spot stock went as at low as 20 45¢ on Metal Exchange contracts and quite as cheaply at private sale. A month ago the spot price was 21¢, bid. In the interval there has been more or less buying to "average down," with the expectation that the restriction of importations by the McKinley duty should naturally turn the tide by November 1. The speculation, however, has proved to be one of those frequent experiences wherein buyers found it easy to purchase goods, but difficult to realize profits. Steadily declining prices in London, due chiefly to heavy shipments of Tin thence from the primary sources of supply, have doubtless had a certain unfavorable bearing, but lack of local support and absence of outside speculative demand leaves the principal holders at some disadvantage. Apropos of the movement from the Straits, it is worthy of note that 1850 tons were sent to Great Britain and 200 tons to the Continent during the last half of October, and that the total shipments for the month were 3500 tons, against 3225 tons during October last year. This would indicate that the excess in European supply more than balances the decrease in American stocks. The stock in the United States, exclusive of Pacific Coast ports, is, according to the Metal Exchange data, down to 3635 tons, against 6710 tons on August 1. Prices were a shade firmer at the close, with 20.50¢ bid for current month delivery, 20.60¢ for November and 20.70¢ @ 20.80¢ for later deliveries.

Pig Lead.—Under speculative manipulation the price for common domestic Lead was raised to 3.50¢ for November and slightly higher for more distant future deliveries. Lead came out and speculative buyers at the advance went out. Prices eased off, as a matter of course, and very few contracts changed hands at the decline. Meanwhile some business was effected quietly at 3.40¢ outside of the speculative circle and the latter price fairly reflected market value at the close for carload or large lots deliverable during the next 30 days. Consumers have been very indifferent buyers of late and their best bids at present are considerably below those made by speculators. At the end of the week actual Lead was on sale at 3.40¢, prompt shipment, in the face of speculative bids of higher prices for distant future deliveries.

Spelter.—The higher range of value established last week has been fully maintained, and surface indications are that sellers have gained some further slight advantage. In any event 3.60¢ @ 3.65¢ stand as close quotations on ordinary Western brands in carload or larger lots, and some few sales were reported at those figures. Dealings in this quarter have been on a rather small scale, however, and the demand at present is rather slow.

Antimony.—Only a moderate business is passing, and the market shows no decided change in any particular. On wholesale lots the quotations are about 9½¢ @ 9¾¢ for Hallett's, 10¢ for L. X., and 10½¢ @ 10¾¢ for Cookson's, in round lots.

Tin Plates.—Although somewhat irregular, the demand for Cokes for both prompt and future delivery has been fairly active, and enough business resulted to impart an air of firmness to the market. Bright Charcoals and Terns have also met with slightly better sale, chiefly in small lots. In a few instances, where assortments are poor, prices rule a shade higher, but the general line of quotations is very similar to that which prevailed a week ago. Spot quotations are as follows: Coke Tins—Penlan grade, IC, 14 x 20, \$5.35; J. B. grade, do., \$5.40; Bessemer full weight, \$5.35 @ \$5.40; light weights, \$4.95 @ \$5 for 100 lb., \$4.85 for 95 lb., \$4.70 @ \$4.75 for 90 lb. Siemens Steel scarce. Stamping Plates—Bessemer Steel, Coke finish, IC basis, \$5.60; Siemens Steel, IC basis, \$5.65; IX basis, \$6.75 @ \$7. Charcoals—Melyn grade, IC, \$6.37½ @ \$6.50; Crosses, \$8; Allaway grade, IC, \$5.60; Crosses, \$6.75; Grange grade, IC, \$5.75; Crosses, \$6.85. Charcoal Terns—Worcester, 14 x 20, scarce; do., 20 x 28, \$11.35; M. F., 14 x 20, \$7.75; do., 20 x 28, \$15; Dean grade, 14 x 20, \$5.30 @ \$5.37½; do., 20 x 28, \$10.50 @ \$10.60; D. R. D. grade, 14 x 20, \$5.15; do., 20 x 28, \$10.10; Alyn, 14 x 20, \$5.32½ @ \$5.35; do., 20 x 28, \$10.40; Wasters—S. T. P. grade, 14 x 20, \$4.75; do., 20 x 28, \$9; Abercarne grade, 14 x 20, \$4.60; do., 20 x 28, \$8.87½.

Mortimer H. Cort, who was connected for over 17 years with the firm of N. L. Cort & Co., has started in business at 9 Burling slip as importer and dealer in Tin Plates, Pig Tin, Sheet Iron and Zinc.

Financial.

The week under review has seen the long looked for vote in the Senate, which decrees the unconditional repeal of the Silver Purchase law. To-day the House passed the Senate bill with its amendments and all doubts are at rest. That this circumstance will have a most important bearing on the general financial situation throughout the country is undoubted. It is for this event that the business and banking communities in particular have been waiting, and it is but reasonable to expect that its consummation will be followed by a general improvement in the country's financial and industrial condition. That this improvement will be a gradual one is more than likely, as it will naturally take some time before confidence—verbally a plant of slow growth—will recover from the rude shocks which it has received during the past months of suspense and financial stringency. It is

too early yet to discover any substantial evidence of a revival in trade and commerce, but most of the requisite conditions exist for such recuperation. The banks of the country hold an abundant supply of money ready for profitable investment, and with the assurance of stability in the currency, they are now in good shape to afford the necessary accommodation to borrowers. The New York banks in particular have made enormous gains in their reserves. Last Saturday's statement of the Associated Banks displayed a gain of \$9,000,000 currency through interior remittances. The surplus of reserve above legal requirements increased \$6,140,000, the total now standing at nearly \$49,000,000; figures which have been rarely equaled at this time of the year. The fact of such an abundance of unemployed money being available just at the time when other favorable conditions are developing is a good sign for the prospects of an active revival of business in the near future.

The outstanding Clearing House loan certificates in New York have all been canceled, and, for the first time for many weeks, mention is made of a resumption of gold imports. The sum of \$1,500,000 has been secured by a New York house from London, and is now float. London advices state that a large withdrawal for the United States is expected in that city; and although exchange rose early in this week above a point at which it would be possible to import specie, this condition is regarded as only transitory, while it is known that much capital is waiting on the other side for a favorable time to purchase American securities.

Speculation on the Stock Exchange during the week has been most active, the market prices of nearly all securities rising at one time to a higher level than had been reached since the panic, with a large volume of business. The following statement, giving the business of the exchange for the week ended October 28, shows the remarkable impetus given to speculation by the favorable reports from Washington:

	1893.	1892.	Changes.
Stocks, shares...	2,400,065	2,247,896	Inc.. 152,069
Government bonds...	\$19,800	.....	Inc.. \$ 19,800
State and railroad bonds...	11,714,500	\$7,519,000	Inc.. 4,195,500
Silver certs. oz	30,000	302,000	Dec.. 312,000
Stock rights...	7,451	.....	Inc.. 7,451

The last days of the week witnessed a strong and buoyant market, with a large and well distributed volume of trading. Saturday's transactions aggregated 233,195 shares of stock and \$1,126,000 of bonds, a remarkable record for a half holiday. The market closed on Saturday with the whole list of active stocks marked from 5% to 10% higher than on the previous Monday, the upward movement continuing to the end of business. Monday saw, however, a not unexpected reaction in speculation, which carried down the list an average of 1½ points. Erie and Union Pacific suffered in particular from well authenticated rumors that these companies would default in the payment of the November interest on their several bond issues. Tuesday's announcement of the passage of the repeal bill by the Senate failed to stimulate the stock market, which, indeed, suffered from a most decided reaction under a heavy "bear" attack, prices dropping along the whole line. This was accounted for by the fact that

the action of the Senate had been already discounted and acted upon in the advance of from 10% to 15% that had occurred in active stocks during the previous fortnight. It was also said that many speculators had chosen the present time to sell the shares they had bought at low prices during the panic. This was also given as the reason for heavy selling orders from London, which were a marked feature of the day's business. Shrewd foreign operators who acquired stocks during the summer were believed to be intent on securing the handsome profits which have accrued since that time on their purchases. Foreign selling orders of this nature were said to have approached in value about \$3,500,000. The market showed firmer, however, at the close of business. The following list shows the extreme fluctuations of the more active stocks since October 25, with closing quotations for November 1:

	High-est.	Low-est.	Closing, Nov. 1.
Am. Sugar Ref.....	105½	99	102½
Atchison, T. & S. Fé....	23½	20¾	20½
Balt. & Ohio.....	77½	73	75½
Chicago Gas.....	69¾	63½	67¾
Chic., B. & Q.....	87½	82	84
Chic., Mil. & St. Paul...	68¾	63½	66½
Chic., Rock Isl. & Pac..	72½	68½	70½
Del. & Hudson.....	131½	128	130¾
Del., Lack & Western...	172	165	171½
Gen. Electric.....	52	46¼	48¾
Lake Shore.....	129	127	127¾
Louisville & Nashville...	53	47½	50½
Manhattan.....	135	131	133¾
Missouri Pacific.....	29½	25½	27½
Minnesota Iron, asked...	.....	.....	60
National Lead, Common.	29½	27½	28¾
New Jersey Central.....	119½	116	119¾
New York Central.....	104	103	103½
N. Y., L. E. & Western.	16	14	14½
Northern Pacific, Pfd..	25½	22½	23½
Philadelphia & Reading..	23¾	19½	21½
Richmond & West Pt.,	.....	.....	.....
Termi.....	4½	3½	3¾
St. Paul & Omaha.....	39½	37½	39½
Union Pacific.....	21	17½	18¾
Western Union.....	93½	87½	90

Government bonds have been strong and unchanged, with no sales on call. Closing quotations on Wednesday were as follows:

	Bid.	Asked.
2s, 1891, registered.....	96	.....
4s, registered.....	111	112
4s, coupon.....	111	112

The movement in the railroad and miscellaneous bond market last week kept pace with that in the stock market, and nearly 100 issues showed advanced prices, dealings being very large, and over 50% in volume above those of the corresponding week of last year. Values at the same time advanced from 5% to 10% in the more active issues. The general bond market was, however, less active in the early part of the present week, with a downward tendency in prices.

Money on call has been in ample supply at 1½% @ 2%, a number of special transactions having been made at even as low as 1%. The demand for accommodation has not yet, however, expanded to any appreciable extent, and the market is entirely in sellers' favor. Time loans are quoted on readily marketable collateral at 3% @ 3½% for 30 and 60 days, 3½% @ 4% for three and four months, and 4½% @ 5½% for longer terms. Commercial paper continues in good demand by out of town banks, rates being quoted at 5% @ 6% for choice indorsed receivables, 6½% @ 7% for the next grade, and 7% @ 8% for choice single names having from four to six months to run.

Foreign exchange was weak and irregular up to Tuesday, with an increase in the volume of cotton bills offered. On that day, however, the market for sterling stiffened appreciably, notwith-

standing the Senate's action, and bills were in sharp demand against heavy sellings of stocks for London account. Offerings of cotton bills were also lighter. On Wednesday rates were reduced. Actual rates for sterling were quoted at the close as follows: 60 days', \$4.80½; demand, \$4.83½; cables, \$4.83½ @ \$4.84; commercial, \$4.79½ @ 4.79½.

Domestic exchange on New York is quoted as follows: New Orleans, commercial 200 @ 250 discount, bank par; Charleston, buying ½ discount, selling par; San Francisco, sight 15, telegraph 20 premium; Savannah, buying ½ discount, selling ½ discount @ par; Chicago, 75 premium; St. Louis, 60 premium. Boston, 15¢ @ 17¢ discount.

Silver continues to decline, the London price for bars being down to 31½ pence ½ ounce, and in New York 68½¢ ½ ounce. The latest purchases at the Treasury Department were made at 70¢ ½ ounce, being a decline of 4½¢ from the price paid for Silver on the first purchase day of October. A large amount of silver has been exported during the week.

The anthracite coal trade shows steady improvement; the output, amounting to about 1,000,000 tons per week, being regularly absorbed. The total amount of anthracite coal sent to market for the week ending October 21, as reported by the several carrying companies, was 1,034,086 tons, compared with 869,105 tons in the corresponding week of last year, an increase of 164,981 tons, and for the year to that date the total tonnage has been 34,264,530 tons, compared with 33,394,150 tons in the corresponding period of 1892, an increase of 870,380 tons.

The M. C. Bullock Mfg. Company.

The main exhibit of the M. C. Bullock Mfg. Company, in the southeast central section of the Mines and Mining Building, occupied a space of 45 x 47 feet. These exhibitors applied for a much larger space, intending to exhibit several of their newest designs of transfer and underground rope haulage plants, large geared and first motion plants of the conical drum type, like the various plants which they have furnished the great Chapin Mine, and also a pair of tandem compound Bullock-Corliss engines, operating first motion flat rope reels, similar to the plant which they furnished to the famous Huanchaca Mine of Bolivia, the largest silver mine in the world.

Standing in the center of their space was a fine sample of their sectional portable steel derrick tower, triangular in shape, 16 feet wide at the base, while the apex carrying and supporting the sheave towers 52 feet high in the air. This company are the sole manufacturers of these towers, which were designed and brought out by them to send to tropical countries where the ravages of the weather and insects destroy timber so rapidly that the ordinary timber derrick is both costly and dangerous.

The company showed eight different sizes and styles of diamond pointed prospecting core drills, ranging from their small machines for light prospecting, boring holes to a depth of 300 feet, to their regular sizes of prospecting machines capable of boring holes to depths of 1000 feet to 2500 feet, and to their larger size, the Favorite, which has capacity to bore to a depth of 3000 feet. They also showed one of their new Giant drills, the most powerful diamond drill ever built, and which they will guarantee to bore a hole 1

mile deep. The president of the company, Milan C. Bullock, was the pioneer of this valuable mining appliance, which is and has been such a boon to prospectors and mining engineers in all parts of the world. In passing it may be of interest to state that the first diamond drill was invented by an eminent French engineer, Rudolph Leschot, for use in driving the Mont Cenis tunnel. His idea of arranging and securing the diamonds so as to retain them in the steel setting was complete, and was in itself a great invention, but his lack of combined practical knowledge of mechanics and mining prevented his making practical working machines which could be successfully introduced for prospecting purposes.

Space will not permit a detailed description of all varieties of the Bullock diamond drill, but the following outlines may be interesting to the reader: Their little hand power drill, the Bravo or prospector's friend, for surface or inside prospecting will bore a hole 1½ inches in diameter to a depth of 350 feet, taking out a solid cylindrical core 1½ inch in diameter, showing an exact cross section of all strata penetrated. The machine is so portable that it can be readily divided into 20-pound packages for transportation by men or muleback.

The Badger is a new type of machine especially adapted to underground prospecting. It is mounted on columns fitted with extension screws and is designed especially for drilling holes to distances of 500 feet ahead of proposed developments. Its single cylinder engine, designed for use either of steam or compressed air, is of the trunk type with patent valve, readily reversed. The feed screw and feed gears are carried in a hinged swivel head, allowing them to be swung back out of the way while removing and returning the drill rods to the hole. The weight of the machine on columns is but 585 pounds, which can be divided into 50-pound packages for muleback transportation.

The Beacon drill is also of new design, especially adapted for light underground work. It is provided with Bullock-Brotherhood three-cylinder engine, with large ports to prevent freezing when using compressed air, its working parts balanced and arranged to run at a high rotative speed. The feed screw and feed gears are carried in a hinged swivel head which is inclosed to prevent injury to the working parts and for the protection of the operator when working in confined localities. The feed gears are so arranged that the rate of advance or reverse (running back the screw) can be changed while the machine is running by simply moving one lever. The Beacon drill will bore a 1½-inch hole, taking out a 1½ inch core to a depth of 650 feet. It weighs but 530 pounds and can be divided into packages of 50 pounds or less.

The Beauty drill was designed to meet the demand for a light, strong, compact, durable and economical drill, which could be used either on the surface or underground. This machine is driven by a pair of their standard type of trunk engines. It is very compact and light running, and the moving parts are so well balanced that it will run from 1000 to 1500 revolutions per minute without any undue vibration. The valves, ports and passages are short and direct, adapted for use either of steam or compressed air. The swivel head is mounted upon their patent hinged swivel plate, allowing holes to be bored at any desired angle, and can be

opened out from the line of holes to facilitate the manipulation of the rods. It is manufactured as a column drill with elevating reel for adjusting to the required height for work inside of mines, and presents an appearance similar to the Beacon, and can be used either upon bed plate or columns, as desired. This drill is fitted with a hoisting drum capable of handling the required amount of rods, and when mounted on its bed plate weighs only 490 pounds, occupying a space 20 inches square, and can readily be divided into packages weighing not over 75 pounds each. The Beauty bores a 1½-inch hole, taking out a core 1½ inch in diameter to a depth of 800 feet.

The Crescent is a neat, compact machine, somewhat similar in design to the Dauntless, having its hoisting drum and gearing underneath the crank shaft, arranged to be thrown into and out of gear very readily by the movement of one lever. It is also provided with a brake attachment for lowering long lines of heavy rods. This machine is provided with an improved double cylinder type of hydraulic feed, the cross head being provided with a steel guide, which not only steadies the driving of the spindle, but can also be graduated to show the degree of speed at which the bit is penetrating the rock. The Crescent will bore a hole 1½ inches in diameter, taking out a 1½-inch core, to a depth of 800 feet.

The Champion is the smallest drill fitted with Bullock's thrust register, and will bore a 1½-inch hole, taking out a 1½-inch core, to a depth of 1500 feet. The machine weighs only 1200 pounds and can be divided into 100-pound packages for mountain transportation. One of these machines has bored over 100,000 feet of hole and is still in use.

The Dauntless is powerful, durable and economical; is fitted with the patent thrust register and other improvements, and will bore a hole 2 inches in diameter, taking out a 1½-inch core to a depth of 2000 feet. In June, 1893 one of the Dauntless drills completed a 2-inch bore hole at a depth of 2500 feet (the deepest 2-inch hole ever bored), on the Rand-Victoria gold mines at Johannesburg, South Africa, cutting at a depth of 2397 feet a solid blanket vein 5 feet 8 inches wide, carrying a high percentage of visible gold.

The Favorite is one of the latest designs. It is fitted with thrust register, reversible engines and double hoisting drums adapted to handle rapidly and safely long lines of heavy drill rods or casing. It is also fitted with the new device for removing cores from the bottom of deep holes without the loss of time and the labor required for withdrawing and removing the bit and rods and again returning them to the bottom of the hole. For instance, it required ten hours of hard labor for a gang of men to hoist out and return to the bottom of the hole a line of rods 2000 feet long, while with this new apparatus the operators have frequently removed cores from the bottom of holes ranging from 1800 to 2400 feet in depth in 20 to 40 minutes, which covered full time of stopping. The improvement not only effects a saving of time in handling the rods in deep hole prospecting or well boring, but what is of equal importance is the fact that this method of rapid drilling and withdrawal of the cores permits prospecting of the swelling or caving ground which is frequently encountered in the soft coal measures. Among the great number of holes which have been bored with it are three, as follows: One reaching a

depth of 2006 feet 4 inches, another reaching a depth of 2401 feet 10 inches and another reaching a depth of 2463 feet.

The Giant is the largest diamond drill ever built; it is powerful enough to drill holes varying from 8 inches to 14 inches in diameter to a depth of one mile, and is especially designed for very deep hole prospecting or well boring. It handles a long heavy line of casing, rotating it to the left while at the same time the regular boring tools are as rapidly rotating to the right, boring ahead of the casing. The machine is so arranged that by the movement of a single lever the feed can be stopped, while both the lines of drill rods and casing are kept rotating in opposite directions. Or, if desired, the machine can be put to "jacking up" all of the boring tools, or the casing or the boring tools can be "jacked up" separately, and the machine is so powerful that it will lift 40 tons at the rate of 12 feet per minute. This arrangement is valuable in prospecting in loose, swelling or caving ground. On the upper cross head is carried a pair of the patent thrust registers, one of them showing the weight of the rods, while the other registers the pressure on the face of the bit against the rock, showing accurately all changes of measures the instant they occur, and their distance from the surface. The lower cross head carries a similar register gauge which indicates the condition of the casing bit, when the casing becomes clogged by caving ground, &c.

The exhibitors also showed a small air compressing plant consisting of a 6 horse-power Simplex gas engine belted to a 7 x 7 inch water jacketed air compressor. This engine is a new claimant for honors in America. It was invented in France by M. Delamare Deboutteville and M. Malandin, and is being manufactured there in large numbers. It receives one impulse for every other revolution, like other successful gas engines. It has a very simple yet sensitive form of governor, and it will regulate so accurately that it is used extensively for driving electric lighting plants. The charge is fired by electricity, which permits the use of fuel gas of very low illuminating power. In fact, the fuel gas produced by the Lencachez process "from meager coals" (and which is successfully used with the Simplex gas engine) is so poor in illuminating qualities that it cannot be fired by the ordinary "torch" or incandescent tube used on the English and German gas engines. The arrangement of the valves, firing device and primary battery for furnishing the spark is simple and economical in its action. The larger types of engines are supplied with self starters.

The M. C. Bullock Mfg. Company make a new percussion rock drill, the Monarch. The drill can be operated either by steam or compressed air; it is simple, compact and easily handled. Various sizes of these drills are made, mounted for different classes of quarry and mining work. The patent quarry bars, tunnel columns, shaft bars and adjustable tripods contain many new and novel points of excellence which will readily commend them to the practical quarryman or miner. The following outline covers a few (only) of the special claims for excellence and superiority which the manufacturers make for these drills:

1. The piston strikes an uncushioned blow on the rock.
2. While the recovery is very rapid

it is impossible for the piston to strike the back head, for at a certain point of the inward stroke live steam or air at full pressure is admitted behind the piston, thus forming by compression a live cushion which not only receives and arrests the momentum, but starts the piston on its forward stroke with a greater force than that due to the initial pressure of steam.

3. The drill has only two reciprocating parts, the piston and the valve, and the weight of metal is so judiciously distributed that breakage is rare and the cost of repairs is reduced.

4. The drills are all manufactured by the use of jigs and templates, so that all parts are interchangeable, which is of great value to purchasers.

The band friction hoists are built with double engines connected at right angles to the driving shaft, to which is keyed a steel pinion shrouded on both sides for strength; the pinion drives a spur gear which is keyed fast to the drum shaft. The drum is loose on the shaft, the bearing being lined with hard brass bushes to insure longevity and a ready means of repair. The drum is driven by Lane's band friction clutch, which enables the operator to have control of the starting, stopping and lowering of the load without reversing and while the engines are running at full speed. The drum is provided with a powerful band brake for lowering the load without running the engines. Both hoisting and lowering are controlled by the single movement of a hand wheel, which automatically loosens the brake band while tightening the driving band, thus simplifying the manipulation of the machine and diminishing the liability to accident caused by the operator losing his presence of mind. The load may be started gradually, without shock or jar, while the engine is running at full speed, thus bringing the full power of the engine to act on the load in starting it from the bottom, and when the load has reached the top the steam may be shut off, and by one turn of the hand wheel the drum is released and the empty car, bucket, skip or cage is lowered quickly, but under control.

PERSONAL.

James P. Witherow of Pittsburgh sailed for Europe last week.

Sir Henry Wood, secretary of the British World's Fair Commission, has returned to England.

Daniel Adamson of Hyde was a recent visitor in New York.

The statement has been made that low prices for certain grades of pig iron necessarily prove that the metal is being sold below cost of production. It does not follow that because a Southern furnace is selling gray forge at \$6.50 when the cost is \$7.50 that the plant must be losing money. Let it be assumed that a furnace is making pig iron at that figure and that it is producing, say, equal quantities of gray forge, No. 2, and No. 1 foundry. If the furnace is getting \$7.50 for No. 2 and \$8.50 for No. 1, it is evidently selling its whole product at an average of \$7.50, or at cost, even though there may be an apparent loss of \$1 per ton on its sales of gray forge. While our figures are, of course, only chosen by way of illustration, we do believe that there are cases where they are not far out of the way.

Patent and Trade-Mark Laws.

A committee of the Patent and Trade-Mark Congress having had the subject of formulating resolutions before them, reported as follows:

One of the rules under which auxiliary congresses are held is that no resolutions shall be passed relating to controverted matters. We have, therefore, confined those here presented to such matters as seemed to us to have the consensus of all of the opinions which have been heretofore expressed, without attempting to cover many of the valuable suggestions made.

Resolved, By this congress, assembled under the auspices of the World's Congress Auxiliary of the World's Columbian Exposition, for the purpose of considering inventions and trade-marks, and the various systems and laws relating thereto:

1. That for the purpose of encouraging improvements in the useful arts; the development of new industries; and to make it an object for inventors or licensed manufacturers to practically put inventions into operation, a sufficient protection should be given to them to warrant such an undertaking.

2. That as steam and electricity have brought all civilized nations near to each other, some practically uniform international system of granting patents should be adopted under which all of the patents of these several nations may be issued.

3. That some international system for repatenting or registering patents should be adopted by the several nations granting them, whereby patents granted in one country may be made effective in each of the others without burdensome fees, taxes or annuities.

4. That a requirement of working or of putting the invention into use within a stated time is an onerous condition which leads to the non-patenting and to a consequent non-use of inventions which require extensive plants or machinery, and that it is a condition which retards the introduction of inventions in the countries requiring it.

5. That all patents should for their duration be independent of patents for the same invention in other countries and be granted for the same term as that allowed by law for patents in the country granting them, and with no further restrictions than that the applications therefor be limited to the time fixed for applications by citizens and the date of grant antedating that of the oldest prior patent.

6. That a trade-mark valid in one country should be valid the world over to the first user, except only when antagonistic to local laws as to good morals.

7. That priority in the matter of trade-marks should be referred to the time of the commencement of a continuous user, and not to the date of a registration.

8. That a mark connected with a false indication of origin should be considered contrary to good morals.

9. That a committee of five be appointed by the president of this congress charged with the duty of bringing these resolutions before the Congress of the United States and the legislatures of other countries, as well as any future conference under the convention for the Protection of Industrial Property concluded at Paris, March 20, 1883, and to take such steps as they shall deem

proper to perpetuate this congress as a body for the amelioration of patent and trade-mark laws in their international relations; that this committee have power to fill vacancies and to add to their number members from each country desiring to aid in these enterprises. L. L. Bond, J. M. Thacher, James Buchanan, R. J. Gatling, Francis Forbes, committee.

The committee also reported the following as proposed by Dr. Carl Pieper of Germany: That the culpability of dishonest competition should be universally established and efficiently enforced on the wide field of industrial property. This was also adopted.

The Evolution of the Nail.

The first nails produced in the United States were made by hand, and Fisher Ames of Massachusetts, in a speech made before Congress in 1789, when it was proposed to put a duty of a cent a pound upon all imported spikes, nails, tacks and brads, in order to foster the home product, said of this industry: "It has become common for the country people in Massachusetts to erect small forges in their chimney corners, and in winter and on evenings when little other work can be done, great quantities of nails are made, even by children. These people take the rod iron of the merchant and return him the nails; and in consequence of this easy mode of barter, the manufacture is prodigiously great. This business might be prosecuted in a similar manner in every State exerting equal industry."

In August, 1797, Samuel Briggs of Philadelphia, in connection with his son, is said to have received the first patent for a nail making machine ever issued by the United States, but as at about the same time several inventions for manufacturing nails were made by various persons in different parts of the country, it is still a somewhat disputed point to whom the credit of absolute priority is due.

In 1817 the device known as the Blanchard machine, an invention of Thomas Blanchard and others of Boston, was successfully demonstrated in practical use, and the patent sold to a company for the comparatively small sum of \$5000. This Blanchard machine was intended particularly for small nails, brads and tacks, and is the basis of the inventions which are in use to-day.

It is a curious contrast presented by the contemplation of a family engaged at odd hours in their home laboriously shaping nails by hand a century ago and the product of a single day of any one of the many nail and tack factories in States which were then an unknown wilderness, or inhabited by wild animals and wilder Indians.

Fifty millions of small nails and tacks is the daily output of several of these factories, weighing in the aggregate a dozen tons or more, and distributed in all the markets of the world. A single machine is capable of cutting and heading over 15,000 tacks an hour, and shoe nails are cut at the rate of 2000 a minute.

It is not many years since it was the custom in many wholesale houses to keep the boys employed in idle moments picking up and straightening out stray nails which had been removed from packing cases. The wire nail, which in its present form is a comparatively recent invention, has from its convenience and lesser cost so completely superseded the finishing nail and patent cut brad that there is little demand for these one time favorites.

Test of Fire-Resisting Materials.

A rather curious and instructive experiment was carried out in Berlin not very long ago, some account of which may prove interesting to our readers. An old building, which was to be removed to make way for new constructions, was secured, and a competitive test of fire-resisting materials instituted. Of course it was impracticable to rebuild the house with real fire proof construction, but in Germany, as here, there are many manufacturers of materials for building fire proof partitions, or for protecting ordinary wooden construction against fire, and the architects and fire engineers who instituted the test thought, with justice, that a thorough trial of these was of great importance, and that the opportunity of making it should not be neglected. In order to make the test conform as closely as possible to the conditions likely to be met with in practice, the different rooms were fitted up in various ways. Several were left as simple living rooms, with such furniture as would be found in ordinary dwellings; one was fitted up as a furniture manufactory, another as a drug store, a third as a molding mill, a fourth as a storage room for furniture and two others as petroleum stores. The rooms were then assigned to the manufacturers who wished to compete for them to protect according to their systems. In order to make the test as comprehensive as possible, however, the manufacturers were required to protect various pieces of iron work by their own systems, and in some cases, where there was a doubt as to the capacity of the fire-proofing material for enduring a sudden shock, heavy weights of iron were supported above them by light wooden frames, so that on the burning of the frames the weights would fall. Arrangements were made for extinguishing the fires both by hydrant streams and hose from a steam fire engine, so as to test the resistance of the various materials to sudden cooling and to the violent impact of the engine stream, and, with the scientific thoroughness characteristic of the Germans, a set of pieces of different substances, made for the purpose and fusible at known temperatures, was placed in each room, so that the temperature produced by the fire would be registered.

JURY OF EXPERTS.

A jury of experts was appointed, and a large company of architects, fire engineers, builders and scientific men was invited to witness the test. As this lasted several days, the rooms being separately set afire and extinguished, a restaurant in the neighborhood was engaged for the use of the guests, and there the manufacturers displayed drawings and models of their systems, while the preliminary discourse, by the veteran Herr Stude, the Director of the Berlin fire service, was given, and the decisions of the jury announced, in the same place. According to the admirable description in the *Deutsche Bauzeitung*, from which we can only borrow the most important particulars, says the *American Architect and Building News*, it appears that the fire was first set in an upper chamber, which had been treated by an exhibitor from Breslau, a carpenter named Schubert. The novel portion of Herr Schubert's construction consisted in plastering on a network of square wooden rods, interwoven with wire. Plastering in Germany is usually done on reeds, instead of wooden lath, so that the Schubert construction was particularly interesting to the company, and, as his square laths were set with the edge toward the front, he secured a good key, besides protect-

ing a larger part of the surface of the laths than is usual with wooden lathing. In the room tested this sort of lathing was applied in various ways. The old walls and the underside of the rafters were covered with it, and plastered; a partition was made of two thicknesses of it, the laths of the two thicknesses crossing, and plastered on both sides; another partition was made of two thicknesses, but on studding, and the space between filled with slag, and a floor was laid with it and covered with cement, the ceiling under being lathed in the same way, and plastered, while a deafening of earth, in the ordinary German manner, was put between the beams. After the fire was extinguished it was found that, although the temperature, as shown by the fusible standards, had exceeded 1000° C., which is about the melting point of cast iron, the plastering on the Schubert laths showed only unimportant cracks. Where the laths were exposed in these places they were charred, but the mortar at the back of the charred laths was uninjured. The floor of cement on lath was in good condition, and water tight. Besides this construction, however, Herr Schubert showed other devices of a less simple and sensible sort. Among these was a door, consisting of a single sheet of magnesite, applied on a double layer of jute fabric. This door, although it was very small, being only 2 feet wide and less than 6 feet high, had warped under the heat so as to allow the fire to pass through the opening into the next room and patches of the magnesite had scaled off. He had also treated the wooden stairs by soaking them for two weeks with brine and then covering them with asbestos linoleum, a process which the *Deutsche Bauzeitung* calls an "excuse for protection, very disproportionate to the object sought," while it describes the appearance of the staircase as "anything but pleasing."

ONE OF THE MATERIALS TESTED.

The next exhibitor showed a material which reminds one strongly of the so-called "fire proof" materials to which the attention of architects here is frequently called. This substance was a linen canvas, made "fire proof" by impregnation with some mineral salt, and water proof by painting, and represented to be desirable for protecting wood work, covering roofs and laying over floors. According to the report of the jury, who watched its behavior, this valuable material "immediately blazed up" as soon as it was touched by the fire, and, so far as they could see, it presented "no noticeable resistance to fire," although they thought it possible that, being freshly painted, it might not have done so well in this instance as it would under more favorable circumstances. Next to the linen canvas fire proofing came a system of covering with plates of cement-concrete, which was applied to walls, ceilings and floors in one of the rooms, as well as to iron beams; while a partition was built up through the middle of the house, consisting of two thicknesses of it, with an air space between. Although the heat in the room exceeded 1000°, the cement plates resisted admirably. Here and there the cement was slightly cracked, but the wood and iron under it was perfectly protected, the iron beams showing no loss of strength in testing subsequently. The report of the jury pronounced this system, known in Germany as "Boklen's construction" to be "thoroughly fire proof," so far as the results of the test showed.

Sewer pipe manufacturers of the Ohio Valley will, it is stated, form a combination.

HARDWARE.

Condition of Trade.

OCTOBER BUSINESS was on the whole somewhat disappointing, having failed to come up to the more sanguine expectations of many in the trade. The month opened well, with an evident increase in the volume of business, but this increased demand fell off, and the trade of the month as a whole was only moderate, covering in nearly all cases such goods only as were imperatively required. The delay in repealing the purchasing clause of the Sherman bill is generally regarded as the cause of not a little of the curtailment of business, and now that repeal may be regarded as consummated it is anticipated that there will be the return of a more confident feeling, which will be followed, it is hoped, by a steady improvement. The business of the past month was thus considerably less than that of the average October, and fell still further behind that of last year, which was especially good. A similar comparison might be made between the four months of the current half year and the corresponding time of other years. A somewhat extended inquiry among manufacturers in regard to the way in which the business of July, August and September of this year compares with last year develops a wide diversity, all, however, agreeing that this year there has been a very material falling off in the volume of trade. Some manufacturers refer to this year's business in the three months mentioned as being about half of last year's, and in a few cases this year's proportion is still smaller. Other manufacturers advise us that their business this year is as much as 70 or 75 per cent. of last year's, but so large a proportion is not reported by any considerable number. An average figure for the business of Hardware manufacturers during July, August and September of this year, as compared with the same months of 1892, would be probably not far from 60 or 65 per cent. The amount of business of different manufacturers naturally varies largely with the character of the goods and the class

of trade to whom their goods are principally sold. It is the general experience of manufacturers who sell the bulk of their goods to a few large houses that the falling off in this year's trade has been exceptionally heavy, while those who sell to a larger number of customers, including the retail trade and the smaller jobbers, have had a business more nearly normal.

There is little to report in regard to prices except the somewhat lower figures which are ruling on Wire and Cut Nails and Barb Wire, as referred to more fully in the following columns. The tone of the market, however, is not so strong as it has been, and in other lines concessions are made more freely. Some of the leading jobbing houses are also cutting prices with a view to effecting sales and thus lightening their at present not over heavy stock. Some manufacturers, also with a view to securing orders, are yielding somewhat in the matter of prices, but on the whole a conservative disposition prevails among manufacturers and prevents them from seeking business at unprofitable prices. A reduction in the price of raw material in some lines, with lower wages, enables them, however, to produce some goods at a slightly diminished cost. The production of goods in nearly all lines is largely curtailed, manufacturers avoiding the accumulation of stocks, and throughout the country, in the hands of both the wholesale and retail trade, stocks are unquestionably much lighter than usual. When the demand for goods is again vigorous there will probably be difficulty in obtaining them. Much less complaint is made of late in regard to collections, and the financial condition appears to be constantly improving.

Chicago.

(By Telegraph.)

Shelf Hardware jobbers report their trade very dull. The demand for season goods is over for the time, and orders now being received are for general Hardware, but in only very small lots. The country merchants are buying merely what they are absolutely compelled to take, and are keeping their stocks as low as possible. They report

that they are cutting down their credits as much as they can, and keeping themselves in good financial shape for what they fear is a period of decided dullness. Jobbers here are inclined to the opinion that the coming two months will be productive of very little business in Shelf Hardware. A great deal more is doing in Heavy Hardware, but mainly in the line of Iron and Steel to the implement manufacturers. The wagon and carriage builders are still doing very little or nothing.

St. Louis.

(By Telegraph.)

There is a gradual improvement in the demand for Hardware, more particularly for shelf goods. A few straggling orders for Builders' Hardware are also received, and a general assortment of winter goods are found in orders now coming in. The general opinion is now current, based on the absolute certainty of repeal, that a largely increased trade will be in order after the turn of the year. One of the largest jobbing houses has just sent out specifications for goods, the delivery of which in former years commenced in January, but which now call for delivery commencing with December and a guarantee that the shipments will be made according to contract. This is a strong indication that this house at least are firm believers in better times in the very near future. Prices are inclined to be a trifle firmer, and some considerable improvement is expected in this direction as the demand continues to improve.

Boston.

BIGELOW & DOWSE.—The Hardware trade is comparatively busy, but no one claims that the volume is as large as it should be at this season. As no one expects it every one is happy in the thought that he is in good company. Dealers' stocks are light and orders from retailers cover the whole line. Outside of a few staple goods prices are being well sustained. Prices of both Steel Cut and Wire Nails are lower. Cordage, Carriage and Machine Bolts and Lag Screws are lower. What the effect of the repeal of the silver clause of the Sherman bill will be no one is willing to prophesy, but all seem to agree that if the Senate had been as prompt in its action as the House every one would have been benefited, but that it is too late now to help trade this fall.

The ease in the money market must help trade in the future. It is helping the remittances now. The indebtedness of the Hardware trade is less now than it has been for a series of years and it is not thought that there will be many failures this fall.

Baltimore.

CARLIN & FULTON.—Stimulated by cool weather, trade seems more active than when we last wrote, and orders, though not large, are more numerous. Seasonable goods are moving fairly well, and with the recollection of last winter's experience with Skates there is a disposition this year not to wait until the last moment to purchase that line, but to exercise a little faith in the probabilities of ice and snow during the coming winter.

Our travelers in the cotton States report a scarcity of goods in the hands of the retailers, but at the present time they are more interested in marketing the cotton crop and in making collections than in buying goods, and in fact there is never much business done in that section at this time of the year.

It will take some time yet for the trade to recover from the paralysis caused by the action of the United States Senate, but there will undoubtedly be a reaction in the not distant future.

Omaha.

LEE-CLARKE-ANDRESEN HARDWARE COMPANY.—The improvement in the volume of business noted in our previous report still continues. Although orders are not large the aggregate is augmented by the excessive number received daily.

October closes with a record fully up to the same month two years since. It could not be expected to rival October, 1892. Dealers, of course, are not buying with the freedom that formerly characterized their purchases, and economy is more popular just now than extravagance.

Stocks of all kinds are kept down to lowest possible limit, and it is a matter of surprise that the total volume of business should be as large as it is, taking all the drawbacks into consideration.

Collections are strongly inclined to drag, and complaint of the slowness of the country in meeting obligations is frequently heard.

The tremendous draft that the World's Fair has made upon this country is about exhausted, and the immense sums of money left in Chicago by Western visitors, it may be assumed, will return before long, and business must soon feel the effect of the restoration of the natural order of things.

Portland, Ore.

CORBETT, FAILING & ROBERTSON.—With a favorable change in the weather one's ideas of the future are likely to rise with the barometer. In Eastern Oregon and Washington the harvesting machinery is again at work. Should the good weather continue for a month undoubtedly a large amount of grain will be saved that was looked on as lost. The outlook, however, for an increase in business has not improved since our last. While better weather may help some to make payments on accounts now too large and long past due, there will be a necessity of carrying over to the fall of 1894 many that have been expected to pay up sure this fall.

The news of the probable repeal of the Sherman bill that has just reached

us gives general satisfaction. Of late it has been hard to find silver men. Many that were for free coinage do not even stop at bimetallism, but go to the extreme of gold only. The curtailment in credits and locking up of money has taught them the evil of their ways where argument only failed to reach them.

St. Paul.

FARWELL, OZMUN, KIRK & Co.—There are but few items of special interest to the trade to report. Business is moving along in about the usual current, to which we have grown accustomed this year. There is considerable demand for seasonable goods, and also some trade in the general line of shelf goods, but the volume of trade is considerably less than that of the corresponding time last year, and jobbers have accepted the situation and have adapted themselves to it to the fullest extent possible. Retail dealers have bought so sparingly for some months past that their stocks are very low, and they are obliged to send in orders more frequently, thus increasing the number of orders, but the amount of sales is, as stated, considerably below those of '92.

Prices have been fairly well maintained in almost all lines of goods; the only special exception being that of Ammunition, which, for some reason, seems to have become somewhat demoralized. It is remarkable that this should occur, as orders for Ammunition have been filled sparingly and quite unsatisfactorily, and jobbers have been more or less out of stock all the while. Still it is a fact that some houses are cutting prices on Ammunition and this is not confined alone to the goods made by those houses whose reputation as to the quality of the goods has not been of the foremost. What the result will be the future alone will determine.

Collections are up to expectations. They might be better, and, again, they might have been considerably poorer. If wheat were bringing 15 cents per bushel higher price trade and collections would be both decidedly improved, but thus far there does not seem much hope of advance at an early date.

Louisville.

W. B. BELKNAP & Co.—A fair volume of business is maintained, based on the barest necessities of consumption. The amount of purchasing is more than usually limited, inasmuch as prices show especial strength, or at least not any tendency toward reaction from their very low level.

There is not an overplentiful supply of goods. It is difficult really to get an assorted order filled at the factory with any degree of promptness.

There is still a marked scarcity of Ammunition and Loaded Shells—factories claim to be several weeks behind in orders, and delayed shipments would confirm this.

Continued low water in the Ohio River has thrown all of the Wheeling and Pittsburgh tonnage, which often comes by river, on to the railroads. This freight with the unusual passenger travel has conspired to keep the railroads tolerably busy, although many of them are showing a heavy decrease in earnings.

A firm belief in the ultimate triumph of repeal in the Senate is the only thing which has given business any life at all. The success of the measure is now fully discounted. The accumulation of money in the various financial institutions (which is noticeable here as elsewhere) is doing us very little good until there is a willingness to lend it out on reasonable security. The shrinkage in values and general liquidation have been something extremely unpleasant to reflect on. Possibly it may delight us at some future date to remember these things, but that possibility seems so very remote that it can hardly be taken into account.

Philadelphia.**SUPPLER HARDWARE COMPANY.—**

If there has been any change in the volume of trade since our last letter it can be safely said that it is on the side of improvement over the preceding two weeks. Orders have been more frequent and covered a greater line of goods, although in the aggregate they will in no way compare favorably with the trade of one year ago.

We fear in many cases customers have lost their aggressive ambition which existed one year ago; otherwise the hopeful signs as seen in the blue skies at a distance would inspire them with greater confidence for the future.

Credits are scrutinized more carefully than one year ago, especially with the class of trade who were unfavorably located, or who have heretofore been looked upon as "chronic slow pay."

A little incident quite appropriate to the occasion is told by a traveling salesman. While discussing the financial stringency with a customer the customer stated: "Well, I simply at present cannot pay my merchandise accounts as they fall due. My creditors must wait." Said the salesman, "Why, this is a perfect picnic for you. You never did pay your bills promptly. You now have a reasonable excuse, while before it was a chronic disease with you."

We fancy all houses have had some similar experiences during the last four months. Fortunately, however, a large portion of the trade have a higher regard for their credit, and, under ordinary trade conditions, so systematically manage their business and so watch their maturing accounts that it is unusual for them to be behind in their payments; but, as a rule, we find it is always wise to deal cautiously with a customer who "becomes mad" when one asks for his just dues.

The country has had great occasion and necessity during the last five months to practice what is first impressed upon them in early youth: "Faith, Hope and Charity, and the greatest of these is Charity."

The shock given to our finances some months ago entered the vitals of our banking institutions and trust companies, as well as savings banks, where the mechanic, farmer and wage earner had deposited their slim savings. It closed the doors of hundreds of banks, which resulted in business failures unprecedented, and further extended into the Government's old vaults, and affected our revenue receipts, so that our gold reserve has been largely encroached upon, and the receipts are

running behind daily expenditures; industrial enterprises became embarrassed; manufacturers closed their doors, throwing millions of people out of employment, and have compelled many thousands to ask assistance even for their daily bread.

Never was there a time when the country needed more quick and active legislation, in order to quiet the nerves of a diseased nation, yet never has there been shown in the Halls of Congress such partisan insincerity, such calm insolence, total disregard for the welfare of the nation, such insulting indifference to the strong appeals, not only from the President himself, but from 1500 mercantile and trade organizations, non-political Boards of Trade, political organizations (both Democratic and Republican), from manufacturers and jobbers, from merchants (both wholesale and retail), mechanics and farmers. North, South, East and West have all joined in the pressing demand for relief.

No stronger demonstration or evidence of what a majority of the American people desire could possibly have been furnished. Besides this the millions of unemployed throughout manufacturing districts, and the cry from the throats of many thousand hungry wives and children, with the possibility of families being turned from their homes because they could not pay their rent, have had no effect upon those Senators who were sent to Congress to legislate intelligently for the welfare of 65,000,000 of people.

The assumption that the representatives from seven silver mining States, showing a population at the last census of less than 1,000,000, as against 65,000,000 (population of the United States), have controlled the action of the Senate, is misleading. It has been the undercurrent of those Senators unfavorable to repeal, who at heart desired free coinage, while on the surface they favored repeal, who encouraged Senators from the silver mining States in this prolonged struggle.

The comparison of our Senate with the House of Lords, as made by some of our papers, places the thing entirely too mildly. There has not been a time during the last half a century when the House of Lords would dare ignore such demands of the people as have been made upon our Senators. There has never been a time during the last 50 years when the House of Lords were not compelled to adapt themselves to the will of the people less clearly expressed than has been the case in our country during the last five months.

It is always in the power of the Prime Minister, when defeated, to go before the country and the House of Lords invariably concede in their action any overwhelming defeat, while in the case of the Senate, through many long tedious weeks, they have been persistently determined that no vote should be taken.

We have always contended that the silver purchasing clause was but one of the four causes of our financial trouble. Had it been otherwise, while waiting for action of the Senate we would have seen ten failures where one has occurred. Had it been otherwise we would not have seen confidence partially restored at a time when a compromise, far worse than the original bill, was assuming vast proportions and repeal looked doubtful.

The pressing necessity for its repeal becomes more apparent each day, as the amount of gold in the United States Treasury is fast becoming depleted, and

there is great anxiety and uneasiness in the minds of many, who fear that there will be delay in increasing our reserve after the silver bill has been passed by the Senate.

A strengthening of the United States Treasury by \$150,000,000 to \$200,000,000 in gold would leave us in a position to assure the world that we could protect our large outstanding indebtedness. Without this, should Congress adjourn, we are liable to a second panic, which, in its effects, may be greater than the first.

Cleveland.

THE W. BINGHAM COMPANY.—We are sorry to be unable to report any increase in trade since our last, but are thankful to report that it is no worse. It seems to have settled down to a hand to mouth basis that is likely to continue throughout the remainder of the year. Prices are fairly steady, but without that firmness characteristic of a rushing trade. In the cities and manufacturing towns business is rather worse than in agricultural districts. Factories still remain closed altogether or are running on short time. Retailers in this city are not busy. Buildings that have been under way are about completed, and the outlook for the winter is not encouraging. Trade in Mechanics' Tools seems to have dropped off entirely. Collections are fair.

San Francisco.

HUNTINGTON HOPKINS COMPANY.—Trade has of late been without special feature. The grain harvest is over, continuing much later this season than usual. The crops in the northern section of the State are rather light, while in the middle and southern sections they are good. The prices, however, are so very low that it is very discouraging to the farmers. As the crops are marketed money becomes more plentiful and collections have been fairly good of late. As a result of the prevailing hard times economy is the rule, and people are satisfied with the necessities of life, so that trade in some lines is very dull.

Locally the prospects of the coming Midwinter Fair have stimulated trade to a certain extent, and from this source we anticipate a lively winter.

Notes on Prices.

Wire Nails.—The past week has developed lower prices on Wire Nails and the market is now represented by \$1.25 base for carload lots at mill, but orders for large lots can be placed at \$1.20. The aggregate of business has been fairly large, a good many of the trade purchasing for the replenishing of their stocks and most of the mills running, though not to their full capacity. A large sale is reported in the West at a figure somewhat below \$1.20, but it is understood to have been for a lot exceptionally large for these times.

Chicago, by Telegraph.—The Wire Nail manufacturers report a continued flow of orders. Inquiries are coming in from a fresh lot of buyers from time to time, showing that the belief generally prevails that this is a good time to stock up, with prices down to the lowest point on record. Quotations are based

on \$1.32½, Chicago, for largest lots from factory, and \$1.40 to \$1.45 for single carloads. Small lots from stock are quoted in a regular way at \$1.50, but prices show a weakening tendency and good buyers can shade this rate.

Barb Wire.—The Barb Wire market is in an unsettled condition and prices are lower and weak. The market is perhaps fairly represented by the quotation of \$2.15 for carload lots of Four-Point Galvanized at mill, but sales have been made at a lower figure. Some manufacturers are, however, holding at a somewhat higher price. The demand is light.

Chicago, by Telegraph.—The Barb Wire trade seems to be getting lighter. Manufacturers talk discouragingly about the present condition of business and prospects for the winter. The factories in operation are running only on part time and even then seem to be overstocking the market. Ordinary Galvanized Barb Wire is quoted from factory \$2.40 to \$2.50, while 10 cents advance is asked on less than carloads. Jobbers report their trade very quiet, but quote small lots from stock at \$2.55.

Cut Nails.—The weakness developed in the Wire Nail market naturally has its effect on Cut Nails, and prices are not as high or as steady as for the past week or two. The market is represented by the quotation of 95 cents to \$1 basis for carload lots at mill, but sales have been made at somewhat lower figures. The production of the mills is considerably diminished, and in the East is probably not over 60 per cent. of the capacity of the mills. The New York price for small lots from store is \$1.20 to \$1.25.

Chicago, by Telegraph.—The Cut Steel Nail manufacturers are doing a better trade than at any previous time this fall. Orders are coming in quite freely for carload lots and meanwhile specifications are being received in better shape from those having time contracts. Prices are unchanged at \$1.20 to \$1.25, while small lots from stock are still selling at \$1.30.

Champion Egg Opener.—The Champion Egg Opener is put on the market by the Magic Introduction Company, 321 Broadway, New York. A description of the Opener appeared in our last issue. The device is sold to the trade at the following net prices:

Per dozen.
Nickel plated, handsomely embossed... \$2.00
Silver plated, in satin lined case..... 4.50

Crescent Lock Joint Stove Pipe.—This Pipe was illustrated in our last issue as put on the market by Logan, Gregg & Co., Pittsburgh, Pa., by whom it is sold to the trade at the following prices:

4-inch..... \$2.50 6-inch..... \$3.00
5-inch..... 2.75 7-inch..... 3.25

Solid Steel Putty Knife.—A description of this article appeared in *The*

Iron Age of last week. It is put on the market by Chas. J. Healy, 106 Chambers street, New York, and is sold to the trade at \$1 per dozen. The Knife is nickel plated, with embossed handle.

Forg's Adjustable Door Stop and Holder.—This article is manufactured by P. Forg, Somerville, Mass., and was illustrated in our last issue. It is sold to the trade from the following list, which is subject to a discount of from 20 per cent. to 20 and 15 per cent.:

	Per dozen.
No. 155, 2½-inch, with wall bracket or holder.....	\$6.00
No. 155, 3-inch, with wall bracket or holder.....	7.25
No. 156, 2½-inch, with floor bracket or holder.....	5.50
No. 156, 3-inch, with floor bracket or holder.....	6.75

Plumbers' Self Clamping Tacks.—Evory Mfg. Company, 21 and 23 Ann street, New York, are putting these goods on the market, a description of them having appeared in our last issue. The Tacks are sold to the trade from the following list, which is subject to a discount of 20 and 10 per cent. on the plain and galvanized and 20 per cent. on the nickel plated, the prices given being per 100:

<i>Regular Pattern.</i>			
	P. I.	Galv.	N. P.
For ¾ and ½ inch Pipe.....	\$9.00	\$10.00	\$15.50
For ¾ and ¾ inch Pipe.....	10.00	11.00	16.50
For 1 to 1½ inch Pipe.....	11.60	12.75	18.25

<i>Single Corner Pattern.</i>			
For ¾ and ½ inch Pipe.....	\$9.00	\$10.00	\$15.50
For ¾ and ¾ inch Pipe.....	10.00	11.00	16.50
For 1 to 1½ inch Pipe.....	11.60	12.75	18.25

<i>Half Pattern.</i>			
For ¾ and ½ inch Pipe.....	\$5.00	\$6.00	\$9.00
For ¾ and ¾ inch Pipe.....	6.00	7.00	11.00
For 1 to 1½ inch Pipe.....	8.00	9.00	13.00

<i>Flush and Supply.</i>			
For ¾ to 1½ inch Pipe.....	\$22.50	\$35.00	\$50.00

<i>Star Pattern.</i>			
For ¾ to ½ inch Pipe.....	\$7.00	\$8.00	.....
For ¾ to ¾ " " " " " "	8.00	9.00	.....

Glass.—In round numbers there is a capacity for the manufacture of Window Glass in this country equivalent to 1800 pots. Of these about 10 per cent., or 182 pots, are reported as now in operation. It is understood that the Workmen's Wage Committee are willing to sign an agreement for the coming fire upon the same basis as last year's scale; and are, in addition, willing to submit to a reduction equivalent to the reduction in tariff on Glass should the tariff be revised. Indiana and Pittsburgh manufacturers demand a reduction from last year's scale, and are unwilling to accede to the workmen's terms. There are no printed quotations on Glass, but a fair factory price for Window Glass in car lots is probably 85 and 75 per cent. discount for Single, and 85 and 10 per cent. discount for Double, with freight allowance. Special assortments

made up by manufacturers could probably be bought for spot cash in car lots at 85 and 20 per cent. discount. Imported Window Glass is sold at from 75 and 10 and 5 to 80 and 5 per cent. discount. In Plate Glass the price depends entirely upon assortment, and prices from jobbers range from 50 and 10 and 7½ to 60 and 5 per cent. discount. Trade in all lines of Glass is quiet, with little of encouragement for the future.

ANNOUNCEMENT IS MADE by William Rothery, Wm. A. Rothery and Frederick Rothery that the recent death of John Rothery, senior member of the firm of J. & W. Rothery, Matteawan, N. Y., will in no wise change the business carried on by them for so many years. It will be continued as formerly by the surviving member of the old firm and the two sons of the deceased member under the style of Wm. Rothery & Co.

Price-Lists, Circulars, &c.

BELLEVILLE PUMP & SKEIN WORKS, Belleville, Ill.: Air Power and Hand Mining Drills, Ventilating Fans for mines and coal cars, Chilled Car Wheels, Jack Screws, Ratchet and Track Jacks, Copying Presses, &c. These goods are represented in catalogues which illustrate the various lines, with prices and descriptions. Attention is directed to their Post Hand Drill, and the Smith Double Rotary Air Drill, both of which are for use in coal mines.

THE GILBERT & BENNETT MFG. COMPANY, 44 Cliff street, New York, and 148 Lake street, Chicago: Three catalogues—Nos. 125, 126 and 127. The first is devoted to Screens for coal, sand, gravel, &c., Wire Cloth, Coal Dealers' Supplies and Wire Goods. A great variety of Screens is shown for use in handling coal, covering Car Screens, Yard Screens, Pocket or Shute Screens, House Screens, &c. Among these are some new constructions, specially designed to meet particular requirements. The Wire Goods shown in this catalogue consist of Fencing, Poultry Netting, Stove and Grate Guards, &c. The second catalogue is entitled "Fencing and Netting," and covers these subjects thoroughly, including ornamental gates and tools for erecting, fastening and stretching Wire Fencing and Netting. The third catalogue covers Wire Goods in general, such as Flower Stands, Spark Guards, Corn Poppers, Rat Traps, Wire Cloth, Window Guards, Counter and Desk Railing, Stable Fittings, &c. All are profusely illustrated.

NICOL & Co., 55 West Washington street, Chicago: High Art Hair Tools, Hardware specialties, &c. In a catalogue, No. 17, devoted to Hair Tools illustrations, descriptions and prices are given of Nicol's Curling Iron Heater, Aetna Curling Iron Heater, and of the following Curling Irons: Cute, Moustache, Columbia, Queen, French, Favorite, Silver Tipped, Grace Darling, and Cape May; also of Electric Comb Curlers, Cape May Adjustable Wave or Crimping Iron, Lillian Russell silver tipped Crimping Iron and Cape May Pinching Iron. Catalogue No. 18 is devoted to Broom Holders, Twine Boxes, Paper Bag Holders, Wagon Jacks, Bill Files, Showcard Holders, Mail Boxes, House Numbers, Lemon Squeezers, Tourist Lamp Stove, Nut Cracks, Flag Holders, &c.

BRUCE & MARKS, Gas City, Ind.: Marks' patent Grass Hooks, Weymouth patent Hay Knives, Electric and Clipper Corn Knives. An illustrated descriptive price-list shows these goods, with double backs to Corn Knives and Grass Hooks; Corn Knife with hook for picking up fallen corn; also Hay Knife.

THE YOUNGSTOWN STAMPING COMPANY, Youngstown, Ohio: Kerosene Oil Cans, sheet metal specialties, &c. A catalogue devoted to glass oil cans, galvanized iron spout Cans, Tip-top Cans, galvanized Buckets, Sap Pails and Fruit Cans, calls attention to the company's facilities for manufacturing these goods. In addition to the Friend glass Oil Cans, other grades are made including Excelsior, Favorite and Globe. Selected names for quantity orders are made a specialty. Blue brand galvanized iron spout Cans are made in 1, 2, 3 and 5 gallons. Galvanized faucet Cans, Blue brand, are made in 3 and 5 gallons. Cans to tip, Blue brand, are made in 5-gallon sizes only.

How to Keep the Store Neat and Clean.

BY WALTER EIKEL.

That depends on the store—will be an answer which naturally forces itself upon one, when he considers the diversity of store buildings. Where the store means simply a salesroom, with samples only of large goods, and small quantities of shelf goods, the matter of neatness is not nearly as difficult as it is in a store where a single room represents salesroom, office and warehouse combined.

It is absolutely impossible to even imagine a perfectly clean Hardware store. There must be a corner, or a room, and often a number of corners or rooms, where unsightly and dirty things can be stored. Dirt is simply a question of distribution.

Neatness and cleanness mean not so much the absence of dust and dirt as the distribution of these unavoidable evils. When a portion of a store building is devoted only to the display of goods it is not a very difficult matter to keep this portion of the store perfectly neat and clean. Of course, goods will be left on ledges and in improper places during a rush of custom, but a clerk or clerks with an eye for neatness will soon find an otherwise unoccupied moment in which to remedy these irregularities.

INCLINED TO SLOVENLINESS.

"To have a place for everything, and everything in its place," is the great desideratum. This will only be reached when each individual is held responsible for a certain portion of the store, and when clerks who are by nature inclined to slovenliness (and there are such) are forced to be neat in their persons as well as in their surroundings, because a person slovenly dressed, standing behind the counter, will completely counteract the beneficial influence of a neat-looking store on a customer. Of course, it goes without saying that cleanness and neatness are a great attractive feature in a store. Unhappily, many Hardware stores are so unclean and disorderly that ladies

are afraid to enter them. In such stores goods are usually covered with dust; bright goods are to a greater or less extent corroded, often through careless sprinkling, all of which detracts from the selling qualities of the goods. It is a well-known fact that whoever buys goods wants them to be new, and wants them to look new. Even such people as will leave a new Axe in the open yard during a rainy night will not be satisfied to buy an Axe with a rust spot on it.

A SPRINKLING POT.

It is necessary to have a "general cleaning up" of the store once a day. This should commence on opening the store in the morning. It should be made an inflexible rule that all goods should be in their proper places before closing in the evening. By this the accidental sprinkling of water on goods left on the floor during the day will have been avoided. Much importance attaches to the use and abuse of a sprinkling pot. It is a very easy matter to spray a few drops of water into a Nail bin now and then, or on the base of counters and the legs of Stoves; but each drop will count, and will detract from the general appearance of the store. Even in so insignificant a matter as sprinkling it is necessary to use care and judgment. Of sweeping and dusting, the same may be said. It is impossible that these daily cleanings should be anything more than superficial. To make the cleanness of the store as nearly perfect as possible, it is necessary that on each day, after the general cleaning, and during leisure moments, a small portion of the stock be cleaned thoroughly. To do this, goods must be moved from their places and replaced after thorough cleaning. It is very disgusting for a would-be purchaser to have a cloud of dust blown into his face from the top of a bird cage which is being taken from its hook, and where it had hung unmoved since its arrival in the store.

SHOW WINDOWS.

Show windows (and showcases also, to a more limited extent) should contain samples only, so that it is not ordinarily necessary to remove part of a display to supply a customer. When it is unavoidable to thus "rob" a show window, the missing article should be immediately replaced, since nothing is less attractive than a show window with empty spaces in it. Better have no show window than to have one that is not absolutely neat and clean at all times.

CUSTOMERS SEE TOO MUCH.

New goods should in all cases be unpacked and marked as far away from the interference of customers as possible, preferably in the warehouse, and should be stored as quickly as circumstances will permit. It is very undesirable to have customers see too much of the inside workings of your business. It is therefore a necessity to have a place set apart for the storage of goods pending delivery, or the arrival of invoices, for unpacking and marking. Odd goods, such as sam-

ples of articles not in stock, should not be allowed to accumulate in any one place, but should rather be distributed among other similar articles. This will greatly increase the chance of selling, and thus removing them. Never should imperfect goods be allowed to lay about, least of all such as have been returned for imperfections. Broken articles should be either repaired at once, or, when that cannot be done, they should be removed, since all imperfect goods discredit perfect ones of the same kind. Next in importance to the buying and selecting of goods is the keeping of them neat and clean.

Local Hardware Associations.

WE HAVE already referred to the association of Hardware merchants in Chattanooga, Tenn., which has been in successful operation during the present year. Information in regard to the manner in which it is constituted and its method of organization may be of interest to Hardwaremen in other cities and towns, and may suggest the lines on which similar associations may be organized. We accordingly give below a copy of the constitution and by-laws of this association:

Constitution and By-Laws of the Chattanooga Retail Hardware Association.

OFFICERS AND TERMS OF OFFICE.

The officers of the association shall be a president, vice-president, a secretary and a treasurer. The term of office shall be for one year, and the officers shall be elected on the second Monday of March of each year, and shall serve without salary unless the association should see cause to vote a special salary at any time.

DUTIES OF PRESIDENT.

The president shall preside at all meetings. He shall appoint all committees and perform all the duties incident to the office of president.

DUTIES OF VICE-PRESIDENT.

The vice-president shall preside instead of the president in his absence or inability to act.

DUTIES OF SECRETARY.

The secretary shall keep a correct record of all actions taken by the committees and when directed by the association or the committee he shall report same in writing to each member of the association. He shall keep a record of date on which information is given to members, and shall keep a copy book and copy each communication sent out, and perform any duty incumbent upon the office of secretary.

DUTIES OF TREASURER.

The treasurer shall have entire control of the finances of the association. He shall collect all dues and pay all bills and perform any duties incident to the office of treasurer.

MEETINGS.

The regular meetings of the association shall be held on every Monday night unless changed by the president, but the president may call a meeting at any time without stating purpose and

action to be taken, and any action taken at such meetings shall be legal and binding.

GOVERNMENT IN MEETINGS.

Parliamentary usage as laid down in Cushing's manual shall govern this body in meetings.

REGULAR COMMITTEES.

The president may appoint a committee of three on prices. It shall be the duty of this committee to adjust all matters pertaining to prices of goods and any special matter that may be referred to them. He may also appoint a committee on railroad rates, &c. This committee shall take action on matters relating to railroads, such as overcharges, demurrage, &c., where such matters are brought before the association for action, and such other matters as may be referred to them. Also a committee of three on credits and finances. This committee shall have charge of all matters pertaining to giving and taking away credits, reporting on past due accounts unpaid, bad debts, &c., and such other matters as may be referred to them from time to time.

Also a committee of three on legislation. This committee shall keep posted on the laws directly affecting the Hardware trade and where in their judgment any good effect can be brought about in any way, the same shall be reported to the association for action.

ALL ACTION BINDING.

Every member of the association shall be bound by the action of the association and the committees on any matter referred to them.

TERMS OF STANDING COMMITTEES.

All committees shall serve for six months, but the same committees may be reappointed at the option of the president.

DUES.

The dues of each member shall be \$—, payable quarterly, in advance.

ASSESSMENTS.

The association may at any time assess the members by a two-thirds vote of the entire membership.

ELIGIBILITY.

Any Hardware firm in good standing, doing business in Chattanooga, is eligible to membership, and all members of firms are entitled to attend meetings of the association; but each firm will be entitled to one vote only.

This constitution may be amended at any meeting by a two-thirds vote of the entire membership.

Trade Items.

THE CHICAGO HARDWARE SPECIALTY COMPANY, 147 and 149 Lake street, Chicago, are handling a number of novelties in the Hardware line. Among these is the Standard Stove Mat, made of asbestos, and intended for use on oil, gas or gasoline stoves, to place directly over the flame and thus keep food from burning while cooking. It is claimed that articles which usually require constant attention and stirring to keep them from burning can be cooked without stirring by the use of this Mat. They also sell the Sperry combination Grater and Slicer, illustrated in these columns some time since. They further handle the Sunol Express, which is a Tricycle with a box about 28 inches square fastened in the rear to carry merchandise. The rider

sits on a Bicycle saddle on a center post and operates Bicycle pedals which propel the machine by suitable gearing connecting with the rear wheels. The machine is fitted with ball bearings and is otherwise well and durably made.

WE ARE ADVISED that the H. W. Johns Mfg. Company, who handle Peck, Stow & Wilcox Company's insulated linemen's Pliers, have received a letter to the effect that in a recent trolley accident involving a human life it was not necessary to use rubber gloves to remove the live wire, an 8-inch molded mica Plier being the only tool used. The highly charged and dangerous wire was cut quickly and easily without the least shock to the operator.

THE ELMIRA STAMPING & PAPER COMPANY, Elmira, N. Y., make a specialty of Ithaca red rosin sized Sheathing Paper, put up in rolls of 500, 800 and 1000 square feet. They emphasize the point that this Paper is especially desirable for sheathing purposes.

CHARLES N. HIGHBERGER of the Hardware firm of D. P. Highberger & Son, Wilkesburg, Pa., died on the 10th ult., after an illness extending over two months. The deceased was in the twenty-fifth year of his age and had assisted his father in establishing the business in which they were engaged, which was started about two years ago. Previous to engaging in the Hardware business Mr. Highberger had been in the service of the Pennsylvania Railroad Company. Mr. Highberger was married in December last to Miss Grace W. Anderson, youngest daughter of William Anderson of the Pittsburgh *Commercial Gazette*. He is highly spoken of for his integrity and personal qualities.

THE SPECIAL HOLIDAY ANNOUNCEMENT of the Bissell Carpet Sweeper Company for the coming holiday season has just been issued, and comprehends a handsome line of Bissell Sweepers, in the construction of which 12 handsome woods will be used. The Sweepers will be packed, one of each wood in each dozen, and will be furnished at regular prices. In order to stimulate the sale of these goods in the hands of the dealers the Bissell Company propose to first spend several thousand dollars in advertising to consumers through the weeklies and monthlies to create a demand for the Sweepers as Christmas presents. Attached to each one of the Christmas styles of Sweepers will be a lithographed gift card by which this special Sweeper can be identified by customers with the one used in their advertisements. In connection with the cards a line of display cards for the dealers' use will also be distributed. The company state that their aim will be to so widely create a demand for the coming holiday season for their high grade goods that dealers will be warranted in stocking up without fear of carrying any over. A pamphlet is issued by the company illustrating and describing the Sweepers; also showing lithograph gift card, display cards and other advertising matter to accompany the Sweepers.

THE BARB WIRE ACT recently enacted in England is now in force. Under this act, when there is on any land adjoining a highway a fence made of Barb Wire, or on which Barb Wire has been placed, and such Barb Wire is a nuisance to such highway, the legal authorities are authorized to have it removed. It is expected that little time will be lost in abolishing the use of

Barb Wire along the highways, and the authorities are referred to by our English contemporaries as beginning to enforce the provisions of the act. The suggestion is made to ironmongers that they should give attention as to how they may best avail themselves of the opportunities thus presented for supplying and fixing up other sorts of fencing to replace the Barb Wire which is removed. They also suggest that the action of the authorities might advantageously be anticipated, and that business might in this way be secured by the trade.

E. J. HUSSEY & Co., 80 John street, New York, have been appointed sole agents for the Falls Heater in the State of New York, and are also prepared to handle export trade. The Heater consists of a metal drum, with short pipes extending out from its sides. The drum is hung upon a projective from a stand, directly over the chimney of a lamp, for heating small rooms, offices, &c. The Heater can be adjusted in height to suit the lamp over which it is used.

SAMUEL M. NICHOLSON, who for several years has held the positions of vice-president and secretary of the Nicholson File Company, Providence, R. I., was on October 21 elected president to succeed his father, the late William T. Nicholson.

Horseshoe Rack.

WE ARE INDEBTED to Murphy, Maclay & Co., Great Falls, Mon., for a description of the Horseshoe rack shown in the accompanying illustrations, Figs. 798 and 799. The rack consists, it will be observed, of an arrangement of boxes, 12 x 12, 18 inches deep, which are suspended in a frame, as shown in Fig. 798. The construction of the boxes and dimensions are shown in Fig. 799. The boxes have on the sides a $\frac{3}{4}$ -inch hole bored a little above their center, with wrought washers screwed against the sides to serve as bearings. A corre-

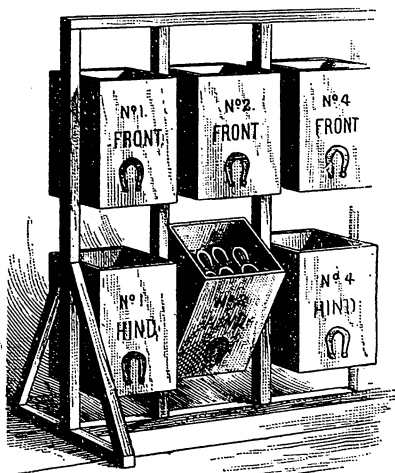


Fig. 798.—Horseshoe Rack.

sponding hole is bored in the uprights and a machine bolt used as an axle. Each box will hold about 125 pounds of Shoes. By tilting the boxes it is easy to get at Shoes for customers and also to replenish the boxes from stock. A sample of the Shoes kept in each box is fastened to the outside, with a printed

designation of the kind and size of Shoe. The extreme height of the frame is 4 feet 2 inches, and the frame is made of sufficient length to accommodate the required number of boxes. Murphy, Maclay & Co. use 32 boxes, which accommodate the three kinds of Shoes they carry. These boxes are divided among four frames, two of which have

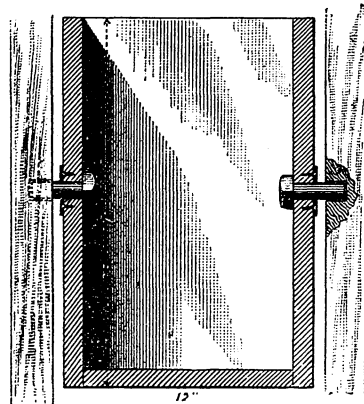


Fig. 799.—Size and Construction of Boxes.

eight boxes each, one ten boxes, and one six boxes. They are located in the warehouse adjoining the store.

Selling At a Loss.

WE HAVE RECEIVED the following interesting communication from an esteemed Western correspondent:

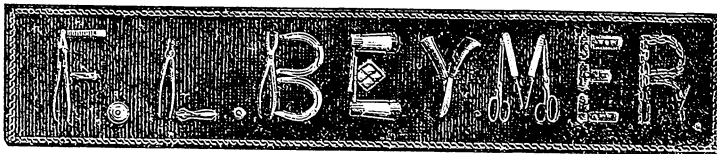
"I sold two carloads out of store Saturday, but did not make a cent—there was no profit in it." The speaker was a young salesman representing one of the largest houses in the iron trade in the West. And why "no profit in it?" Was it because the young man lacked capacity to transact business profitably, or are his employers brainless? If no profit, then a loss. There is no other ending, except the final one of bankruptcy. And bankruptcy brought about by a policy so deliberately suicidal is positive dishonesty. All merchandise ought to be sold at a profit to the merchant. Not a profit that will enable him to just live and finally die poor, but a profit that pays his reasonable expenses of doing business and leaving him a comfortable income for old age and his family. But the policy of "there was no profit in it" induces the merchant to contend fiercely for still lower prices when buying goods, thereby forcing values downward. No sooner has he obtained a slight concession than he wires his traveling salesman "take the order at any price." And the man who has just bought at "any price" at once proceeds to "knock out" his hated rival in business by taking the contract or order when there is "no money in it." And so he swings surely toward the point where he "cannot pay," and the one who sold him "two carloads of goods with no profit in it" is struck with possibly \$15,000 worth of hopeless debt, and then proceeds to tell everybody that these are terrible times. A house strongly intrenched in capital may stand up for many years under such a policy, but the weaker ones die young.

In my experience I recall no instance of a business governed by a sound policy being forced to the wall and com-

pelled to accept defeat. I recall a marked example of selling goods with no profit. A buyer for a large house, in my presence, made a strong attempt to secure a concession on a bill of goods, claiming that they were resold at cost. The house is noted for selling goods at low prices, and while they have secured trade in several of the Oriental countries, I have known profitable business almost at their own doors to be neglected. Why send goods to Japan while home trade goes uncared for? Why sell a carload of goods with a value of, say, from \$1000 to \$1500 for less profit than could be realized on one-tenth of the sum named? When we engage in business we hope to succeed; but we can only have success by getting back our dollar with interest and a profit added. Any other policy than this leads to dishonest bankruptcy.

It is time the press called attention to this subject. It ought to be placed before the eyes of every man in business, and in such a way that when he goes home he will carry the matter in his mind. Thinking about a thing at

Punch and two Horseshoes; the E of two Rattle Boxes, two Nutmeg Graters and a fancy Cake Cutter: the Y of two Farrier Knives; the M of two pairs of Scissors and two Table Knives; the E of Cupboard Catches and the R of Halter Chain. Washers, Octagon Machine Nut and Picture Nail were used for periods. The sign attracted the attention of old and young and was a pronounced success. Above it was an exhibit of Tools and Tinware tastefully arranged on a black background, and beneath it on the floor stood cook and heating Stoves, Coal Vases, &c. In front of the Stoves on the floor was a piece of black cloth 2 x 5 feet in size, upon which was written with small brass Safety Chain, in one piece. "Beymer is on south side of square." The i's were dotted with three links of the Chain, and a small steel Square placed after "of" represented the word square. This was read



A Hardware Sign.

home generally results in something good.

Closely related to this matter of selling goods at no profit is this: Every traveling man ought to be instructed never to make a price on his goods unless there is a reasonable ground for securing an order. It is not good policy to walk into a wholesale Hardware house in St. Paul and, knowing that the house is already heavily stocked with nails and does not wish to buy, offer 30,000 kegs at 10 cents less than market rates. This is bound to "come back" at the traveling man's house sooner or later with bad results.

Business men, you do not like a loss in dollars and cents, but you do like to see good round profits. Some of you are not on the right track to secure the latter. Think of this matter with care and you may adopt a policy that will secure you a good return on your money invested and at a reduced risk. Better sell less and make more profit than make little profit and sell more.

A Hardware Sign.

THERE is much ingenuity shown by Hardware merchants in the arrangement of their names in articles of Hardware, for window or store display, or for use in connection with exhibits at fairs, &c. The arrangement illustrated in the accompanying cut was used by F. L. Beymer of Indianola, Iowa, and was placed in connection with a wall exhibit at a fair. The sign was made on a board 7 feet long and 1 foot wide, surrounded by molding and covered with red plush, a bright chain surrounding the whole as a border. The letters were 8 inches in height and composed of Tools, as shown. The F was formed of Pliers, Rivet Set and Pocket Level; the L of Hog Ringers and Recapper; the B of Spring

by nearly every one who passed the exhibit, and was especially attractive receiving many commendations.

The Atha Tool Company's Catalogue.

THE illustrated catalogue and price-list of the Atha Tool Company, Newark, N. J., just issued, is a handsomely printed book of 158 pages, bound in stiff cloth covers. The manufacturers state that tools stamped Atha Tool Company are made from best cast steel and are fully warranted, while tools stamped J. Rose, and Standard are made from cast steel, but are not warranted. The line of goods shown includes Nail, Carpet, Farriers' and Riveting Hammers; Prospecting Picks; Prospecting, Carriage Ironers', Machinists', Engineers', Blacksmiths', Plow, Coopers', Clipping, Tinner's, Farriers' Turning, Pavers', Upholsters', Saddlers' and File Cutters' Hammers; Coopers' Drivers, Hoop Sets, Splitting Chisels; Stone Axes, Stone Hammers, Stone and Quarry Picks, Masons' Hammers, Stone Sledges, Drilling Hammers, Blacksmiths' Sledges, Wood Choppers' Mauls, Wedges, Mill Picks, Railroad Track Wedges, Crowbars, Swages, Hardies, Tongs, Cold Chisels, &c. The completeness of the lines of Hammers, Sledges and blacksmiths' tools is referred to; also to the fact that the book has been arranged with the idea of making it one which buyers in the jobbing trade will find complete in these goods, and at the same time easy of reference. It is remarked that a new extra quality of adze eye Nail Hammers and Machinists' Hammers has been recently added to their line, and that both styles of this grade of Hammers are nickel plated, and that the quality of material and workmanship are the best. Several styles of Hammers are shown which, it is stated, have be-

come popular, and which are manufactured exclusively by this company. Among these, particular attention is called to the patented Nail Holding Hammer and to the adze eye Machinists' Hammer, both ball pein and straight pein.

It Is Reported—

That O. R. Cross & Co. are successors to H. Moffett & Co., Hardware merchants, Visalia, Cal.

That Beenvenne & Boulanger are a new firm at Suncook, N. H. They will deal in Stoves and Tinware.

That Stephen Squier has entered the Hardware and Stove business at Buffalo, N. Y. He will also conduct a plumbing department.

That Gimmell & Irvine, dealers in Stoves, &c., Parkersburg, Pa., have been succeeded by Irvine & Galbraith.

That the Hardware firm of Lane & Ellis, Corning, N. Y., have dissolved partnership, I. C. Lane purchasing his partner's interest.

That C. F. Linthurst has disposed of his Hardware business at Exeter, Neb., to Chain & Williams of Utica, who have taken possession. Mr. Linthurst will return to Iowa after he has closed up his business affairs at Exeter.

That A. O. Nelson, manager of the Stillwater Hardware Company, Stillwater, Minn., has been succeeded by George L. Bancroft, who comes from Chicago, where he was for a number of years connected with Kelly, Maus & Co.

That Manfred Sears has purchased the interest of Mr. Hester in the Hardware firm of Plummer & Hester, Dallas, Ore.

That S. M. Beattie of Quitman, Mo., has sold his Hardware stock and residence in that place to R. A. Wyatt.

That John W. Lincoln, Plattsburg, Mo., has sold his stock of Hardware to Logan Trimble and Thomas Messick.

That J. W. Lattin, Wahoo, Neb., has purchased the John Schram & Co. Hardware stock and engaged in business. F. M. Adell will be Mr. Lattin's assistant in conducting the store.

That E. A. and N. M. Worden have bought the Hardware store of Taylor, Stebbins & Co., Hinsdale, N. H. The business will be hereafter carried on under the style of the Worden Company. The Worden brothers were part owners of the store for five and a half years under the firm name of Worden, Jones & Co., having bought out L. A. Lamson. They sold out three years ago to the late E. S. Taylor and W. O. Stebbins.

That the Hardware firm of Osborn & Alexander, San Francisco, Cal., has been dissolved. George W. Alexander will continue the business.

That Grimmer & Dick are a new Hardware house at Calais, Maine.

That W. G. Stanton, Hardware merchant, Oneonta, N. Y., has sold out his stock to Lewis & Wilson.

That Thomas Pearce, Hardware merchant, Little Falls, Minn., has removed to Staples, Minn.

That on the night of the 21st ult. the Hardware store of G. G. Gaston, Steubenville, Ohio, was robbed of a large amount of Cutlery and Firearms.

To cover up their tracks the thieves kindled a fire in the rear of the store, but the fire was discovered by passers by and extinguished.

That Bakko & Bredal have succeeded M. O. Bakko & Co. in the Hardware business at Kenyon, Minn.

That Byron D. Wilson has purchased the Hardware store of W. Phillips at Excelsior, Minn.

That McKay & Seymour have succeeded B. F. Fowler, Hardware merchant, at Dickinson, N. D.

That O'Connor & Grandy, Hardware merchants, St. Thomas, N. D., have been succeeded by Joseph O'Connor.

That Coulson & Brundage's Hardware store at La Harpe, Ill., was damaged by fire on the 15th ult. Loss, \$1000; fully insured.

That Laughlin & Brown, McComb, Ohio, have purchased from the receivers the Hardware stock of Orwig & Starr, and will continue the business at the former stand.

That Simpson Bros. & Co., Duncombe, Iowa, have purchased the Hardware stock of Creed & Bailey, and moved it into their new brick building.

That W. G. Oliver, Waupun, Wis., has sold his Hardware business to Lovell & Co. of Hustisford, Wis. Mr. Oliver has been in the Hardware business in Waupun for 41 years and thinks he has earned a rest. He will, however, continue the manufacture of the Oliver Street Lamp.

That John Harphol's Hardware store at Clinton, Ky., was destroyed by fire September 22.

That Fred. Bilsborrow has sold his Hardware business at Paw Paw, Mich., to J. Holmes and E. Bilsborrow, who will conduct it under the firm style of Holmes & Bilsborrow.

That burglars broke into the Hardware store of Everson & Hawkins, Oshawa, Ont., on the 25th ult., and stole some 40 Jackknives.

That the Hardware store of O. A. La Budde, Elkhart, Wis., was robbed on the 21st ult. of \$100 worth of Guns, Razors and Pocket Knives.

That the Hardware firm of Stilwell & Allen, who have been in business at Glens Falls, N. Y., for 16 years, have been dissolved. C. R. Whipple has purchased the interest of J. M. Allen, and the new firm will be Stilwell & Whipple.

That in a large fire at King City, Mo., on the 15th ult., the Hardware store of T. J. Hasty & Son was entirely destroyed.

That Cobban Brothers' Hardware store, at Groveland, Mass., was burglarized on the 19th ult. The safe was blown open and a small sum of money and some watches taken. The explosion smashed a large stock of Glass and Crockery Ware.

That E. A. Allen, dealer in Hardware, Huntington, Mass., is contemplating selling out his stock of Hardware, Stoves and Tin.

That Fred. Kuhn of the Simmons Hardware Company, St. Louis, will shortly be married to Miss Otilie Vilinger of Mascoutah, Ill.

That the store of C. H. Mason, Hardware merchant, Salamanca, N. Y., was destroyed by fire on the 13th ult. Loss, \$4500; insurance, \$3000.

That Mr. Burtress of the Hardware firm of Burtress & Evanson, Ulen, Minn., has disposed of his interest in the business to Herman Dahl.

That the firm of J. H. Burbanks & Co., Hardware dealers, Cohoes, N. Y., was dissolved on the 12th ult. The firm will hereafter be known as Burbanks & Co., the partners being Clara E. Burbanks and Adolphus G. Burbanks. The business will be continued at the old stand.

That the safe in the Hardware store of R. W. Wetherbee, Lincoln, Maine, was blown open on the 15th ult., but the burglars were frightened away.

That Kundert & Fitzgerald's Hardware store, at Madison, S. D. was set on fire on the afternoon of the 11th ult., from a kettle of boiling tar on a gasoline stove in the work room in the rear of the store. The energetic work of the firemen, however, saved the building, although the loss by water and smoke is estimated at \$3000.

Paints and Colors.

It should be understood that the prices quoted in this column are strictly those current in the wholesale market, and that higher prices are paid for retail lots. The quality of goods frequently necessitates a considerable range of prices.

Between slowness of trade in most lines of goods and rather sharp competition in some, the general market presents an unsettled appearance. Thus the "outside" manufacturers of White Lead are aggressive enough to cause some uneasiness among the combined corrodors; the "outsiders" interested in Quicksilver Vermilion manufacture have forced a reduction in association prices, and outside of these lines is a sort of helter skelter competition that gives matters anything but a pleasing appearance. It is remarkable in this connection that lower prices have failed to stimulate business in the slightest degree. Spot purchases have been of very commonplace type, at all events, and orders for future deliveries lose something by comparison with the general run at this season of the year. Just now the prospects do not appear brilliant for radical improvement in any line.

White Lead.—Between private offering of "outside" brands at low prices and the aggressiveness of some manufacturers of "quick process" Lead in both private and Government contracts, the market is at least superficially disturbed. Some jobbers go so far as to intimate that the combined corrodors have made special prices in a broader area of territory than is generally understood, and that the official list and terms are more "nominal" than otherwise. That jobbers still sell at prices under the "list" is beyond all question of doubt, and there are some signs that the general market, under weight of various adverse influences, is really a weak one.

Red Lead.—Purchases of foreign stock in bulk have been on a moderate scale, and the demand is rather slow at present. German is offered in round lots, to arrive, at 6½¢, and might be secured at a shade less for December or later shipment. The naval contract for domestic was taken at a shade under 5½¢ by an outside manufacturer and knowledge of the fact has a momentarily unfavorable influence upon the general market, as far as large buyers are concerned.

Litharge.—The demand has fallen off to very moderate proportions and business is at present on a rather small scale. There is no positive change in prices, but the market seems to be a shade easier, particularly for the low grades.

Orange Mineral.—Quite good sales have been made of French and German brands for near future delivery, but the movement has not sufficed to affect prices materially. Domestic is quiet and without change.

Zincs.—Raw material has advanced somewhat in price, and that fact, along with steady deliveries of Oxide on former orders, imparts better tone to the market for the latter. New business, however, is still on a moderate scale. Foreign brands sell slowly and at somewhat irregular prices.

Colors, &c.—In American Quicksilver Vermilion prices a reduction to the basis of 53¢ for bulk and 54¢ for bags has been made by the association. Outside manufacturers are meeting the reduction and the market at present is unsettled. In other lines of Colors no positive changes have been announced, but the general market looks rather soft and is unmistakably slow.

Oils and Turpentine.

Drawing the line at a further advance in pressers' prices for Lard Oil for prompt delivery, there has been no change to speak of in the market for Animal and Vegetable Oils. Speculation has remained dormant and export interest continues very tame in all departments. Home trade buying, except of Cotton Seed product by a few large Western consumers, has been of strictly conservative type. As a whole, the situation remains very much the same as it was a week ago, with little sign of immediate radical movement in values.

Lined Oil.—City pressers keep their price at 40¢ for Raw Oil, and outside brands are offered at 38¢. There has been no pressure to sell from either source, and the market has gained in tone to that extent. The periodical rumor of an agreement between the conflicting interests has circulation, but it does not appear that buyers have been influenced thereby to the slightest extent. In any event most reports were to the effect that business is merely fair for the season.

Cotton Seed Oils.—Fairly good sales have been made of both crude and refined product. It was an uneven, fitful business, but ultimately operated to stiffen prices, and at the close the market showed quite steady tone. Prime crude brought 36¢ @ 36½¢, prime Summer Yellow 40¢ @ 41¢, and other grades corresponding prices.

Lard Oil.—City pressers have advanced their price for prime Oil to 80¢ upward. Receivers of Western brands are asking quite as much, and the general report is that available supplies are moderate. Sales have been small at the advance, and the demand just now is very sluggish.

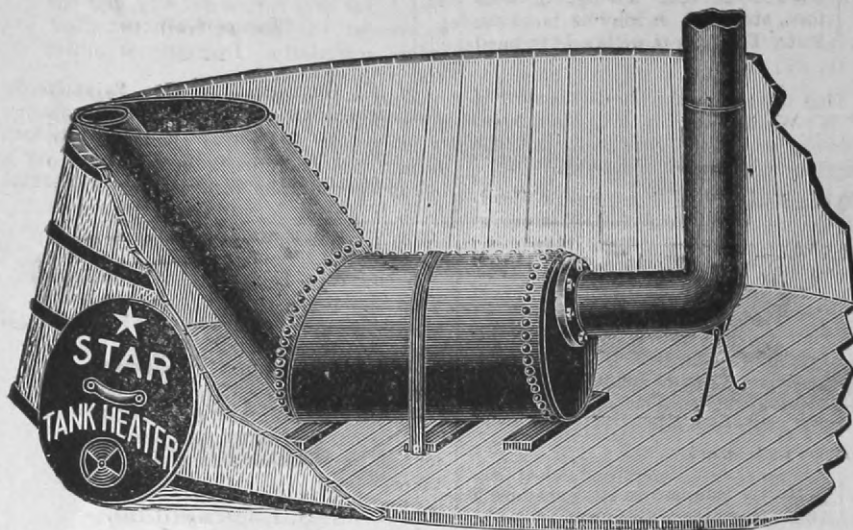
Miscellaneous.—There has been no change in the market for any variety of Fish Oils and former prices prevail throughout. Olive Oil has met with somewhat freer sale at last week's prices. Coconut Oil is unchanged and has met with slow sale.

Spirits Turpentine.—Under the influence of quite lively demand prices advanced to 31¢ @ 31½¢, as to style of package. Since then there has been a slight reaction, but the market shows very good tone in the absence of any considerable addition to the supply here.

The Star Steel Tank Heater.

An illustration is presented herewith of a tank heater which has been brought out by Hunt, Helm & Ferris of Harvard, Ill. As will be seen from the cut, it is a stove made of heavy boiler steel which is intended to be placed in the

nut E has a thread of coarser pitch than the thread in the nut A, thus the same operation of the handle causes the jaw F to move toward the material held in the vise at a slightly faster pace than the slide J, the object of this being to prevent the springing of the jaw from the top edge of the material. When the handle G is in a vertical position a



The Star Steel Tank Heater.

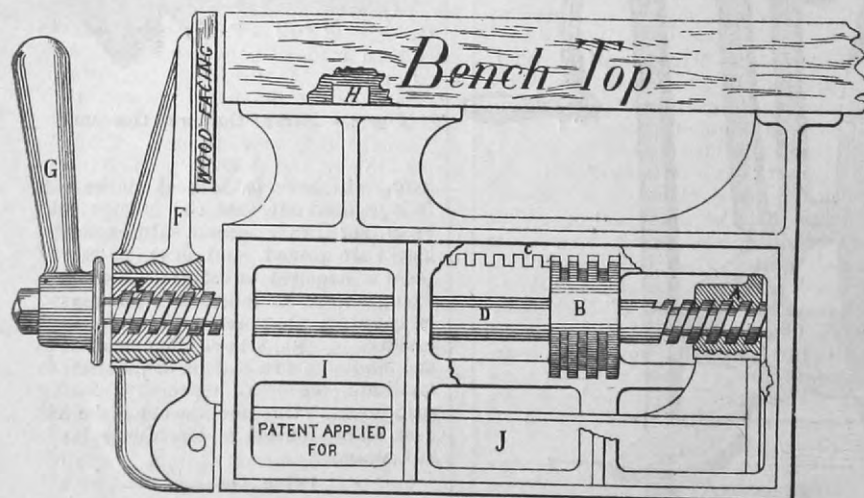
tank to be heated and is almost entirely under the water. It is intended to burn any kind of fuel—hard or soft coal, wood, chips or cobs—can be set in any tank without cutting the tank and the ashes can be taken up at any time without disturbing the fire. Being made of wrought metal exclusively, it is not liable to be broken in shipping, nor to crack or break when in use.

The Lightning Quick Acting Bench Vise.

George A. Gumpert & Co., 146 Bread street, Philadelphia, are putting on the market a quick acting bench vise, as illustrated herewith. The device consists of a cast iron casing I having the rack C in its top. The

blank part in the wheel B, from which the thread is cut away, allows the wheel B to run clear of the rack C when the front is pulled out or pushed in. In operation material is held against the edge of the bench, the vise front pushed forward as far as it will go, and the handle turned until the material is held tightly. It is claimed that this is a quick acting vise, combining the screw principle with rapidity of action, in such a way as to secure a tight grip; that it can be attached to a bench in a few moments; that it will take work from zero to 9 inches in thickness, and that it is always ready for instant operation.

THE AMERICAN AXE & TOOL COMPANY'S plant, at East Douglas, Mass., was visited by fire on the 21st ult., the



The Lightning Quick Acting Bench Vise.

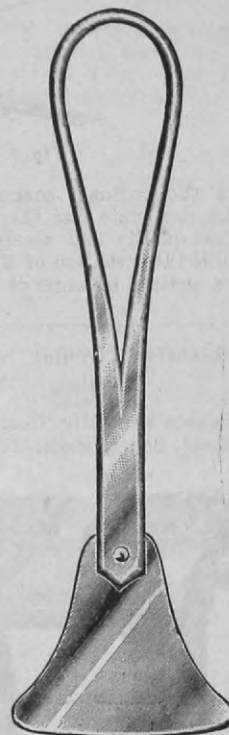
shaft D is made from cold rolled shafting, held in place by the phosphor bronze wheel B. The shaft is connected with the slide J by means of the nut A, and by turning the handle G the slide is made to move backward. The toggle

reports in regard to which in the daily newspapers have greatly exaggerated the facts. The building destroyed was 200 x 65 feet in dimensions, and the loss, we are advised, is inside of \$65,000, which is fairly, if not fully, cov-

ered by insurance. Adjusters are now working on the claim. The shop destroyed never employed more than 60 men. The company's stock of Axes at that point, having been stored elsewhere, was not injured, so that by utilizing other factories the company do not expect to be embarrassed in executing orders.

Streeter's Pot Scraper.

The cut herewith shown represents a pot scraper put on the market by N. R. Streeter & Co., Groton, N. Y. It consists of a nickel plated steel blade with a sharpened rounded edge, the blade being attached to a nickel plated metal handle. A combined pot chain and scraper also is made by the same company, in which a pot chain is hung to the blade of a scraper, similar in shape



Streeter's Pot Scraper.

to the one shown in the cut. In operation the scraper blade is put on the pot chain for scouring, or the scraper may be used by itself. This arrangement obviates the necessity of the hand coming in contact with the pot chain when cleaning pots, kettles, &c.

McGuire's Edging Shears.

Dille & McGuire Mfg. Company, Richmond, Ind., for whom S. A. Haines is manager of the sales department, are

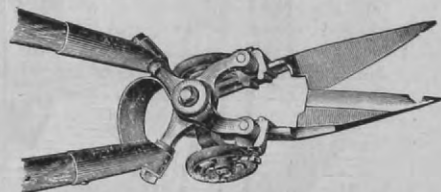


Fig. 1.—McGuire's Edging Shears.

putting on the market edging shears with detachable handles, as herewith shown, a patent on which has been applied for. In Fig. 1 the shears are shown, while their use is illustrated in Fig. 2. They are designed for borders and edges where the ordinary mower cannot be operated. They are also used

for trimming shrubbery, both high and low. If desirable the handles may be readily detached and the shears used by

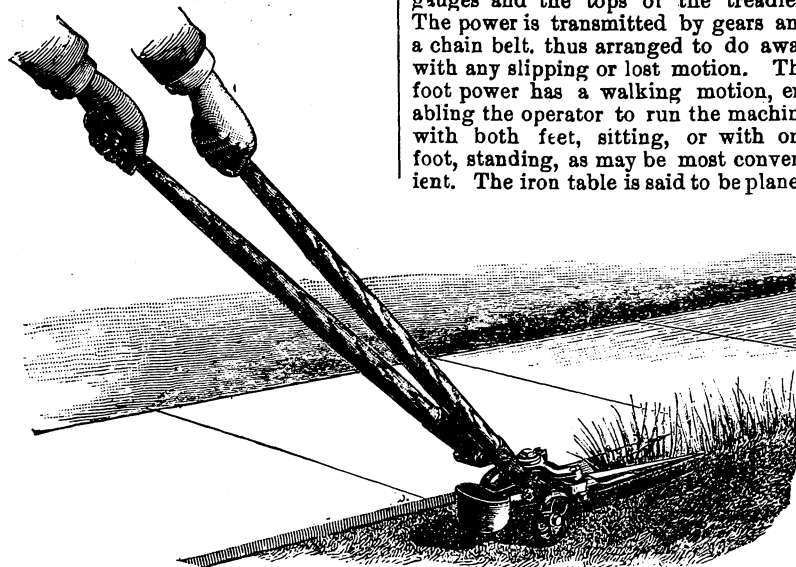


Fig. 2—Edging Shears in Operation.

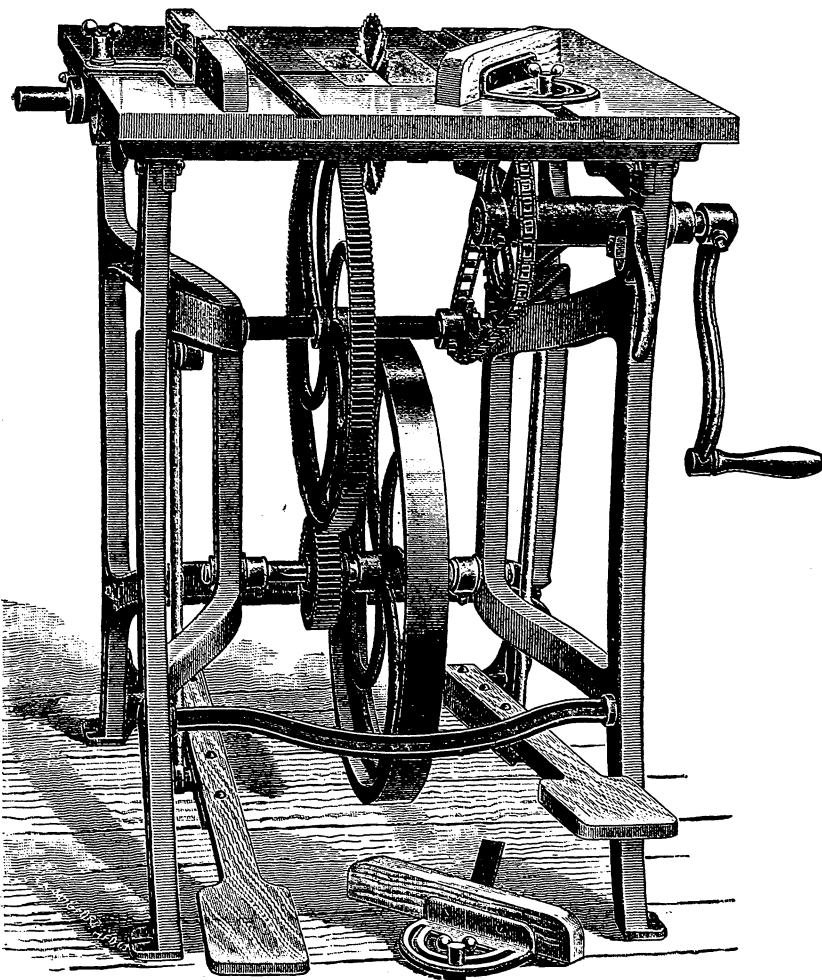
hand in the ordinary manner. The manufacturers state that the shears are of the best quality and nicely finished. The tool is the invention of Elwood W. McGuire, general manager of the company.

Combination Circular Sawing Machine.

The Seneca Falls Mfg. Company, 209 Water street, Seneca Falls, N. Y., are

and steel, with the exception of the hardwood strips in the center of the table, as well as on the face of the gauges and the tops of the treadles. The power is transmitted by gears and a chain belt, thus arranged to do away with any slipping or lost motion. The foot power has a walking motion, enabling the operator to run the machine with both feet, sitting, or with one foot, standing, as may be most convenient. The iron table is said to be planed

perfectly true and in its center are fitted two adjustable sliding cut off or miter gauges and one rip gauge having steel slides fitting the grooves in the table, thus securing, it is claimed, accuracy in their adjustments. The table is hinged at the back and can be adjusted up or down by the hand screw in front for grooving, rabbeting, &c. The machine has been especially designed for the use of carpenters, cabinet, pattern, picture frame and box makers, as well



Combination Circular Sawing Machine.

putting on the market the combination circular sawing machine herewith shown. The machine is made of iron

as wood workers generally, and is known as a No. 2 Union combination saw. The manufacturers refer to the

machine as being strong, substantial and thoroughly well built, suitable for various kinds of work in light ripping, cutting off, mitering, grooving, gaining, edging up, boring, jointing stuff, &c. Ready for use the machine weighs 305 pounds and when boxed for shipment 410 pounds.

Change Gatherer.

E. Chouanard, 3 Rue Saint-Denis, Paris, France, is offering the change gatherer as herewith shown. It consists of a metallic tray mounted on a base, the tray being held in a horizontal

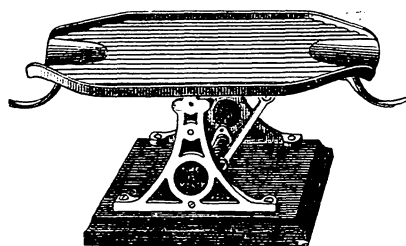


Fig. 1.—Change Gatherer.

position when not in use, as shown in Fig. 1. Change in coins is placed on the tray by the salesman and slides into the hand of the customer when he tips the tray, by pressing downward with the back of the hand upon the projecting lever at either end. Thus the gatherer may be operated by either

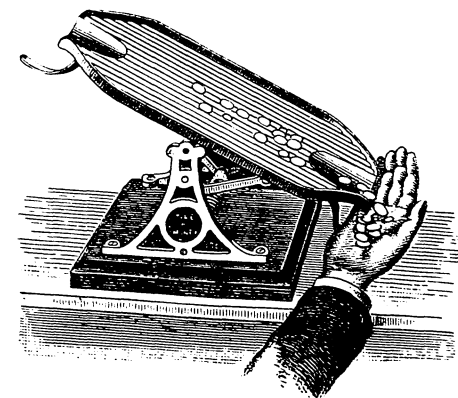


Fig. 2.—Change Gatherer Operated.

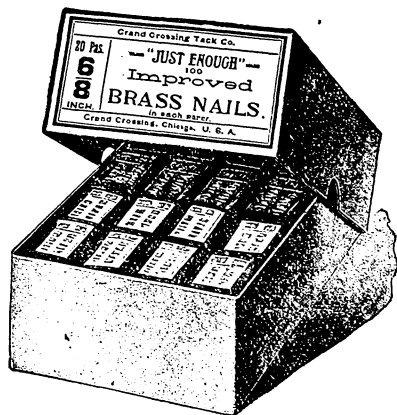
hand, whichever is the most convenient. It is pointed out that the change may be gathered in a second, although the hands are gloved, and even if one of them is engaged in carrying packages. The gatherer is designed to be placed on counters, showcases and in front of cashiers' desks, ticket office windows, and similar places and is calculated to facilitate business, especially during rush hours. One of these machines has been on exhibition in Machinery Hall, at Chicago.

E. BENEDICT died at his home in Wellington, Ohio, of heart failure on October 25, in the sixty-seventh year of his age. The deceased was born in Sharon, Conn., April 7, 1826, was a miller by trade, but came to Wellington in 1854 and there engaged in the Hardware business, which he carried on to the time of his death. Mr. Benedict is referred to as an exemplary

citizen, whose loss will be felt by a wide circle of business associates and friends.

"Just Enough" Improved Brass Nails.

Grand Crossing Tack Company, Chicago, Ill., are putting up $\frac{1}{2}$ brass nails, as shown in the accompanying cut. The nails are for tapping shoes, and for this purpose each paper contains 100 nails, just enough, it is stated, to tap any pair of boots or shoes. The nails retail at 5 cents a paper, and are packed 20 papers in a carton, 50 cartons in a



"Just Enough" Improved Brass Nails.

case. Swedes iron nails are put up by this company in the same form, but in "double enough" packages, each paper containing 200 nails, or enough nails to tap two pairs of boots or shoes.

New Publications.

CHANCES OF SUCCESS. Episodes and Observations in the Life of a Busy Man. By Erastus Wiman.

Erastus Wiman has been a conspicuous figure in business circles in this country and Canada for a number of years, and has been at different times an eager, if not a very judicious champion of causes coming up. His anxiety to bring together his native and his adopted country has led to scenes bordering on the humorous. He has attempted again and again to drag the Canadians and Americans into one another's arms without conspicuous success thus far. Mr. Wiman has met the majority of the leading men who are making history in this country, and has an exceedingly entertaining and clever way of narrating his experiences. This and a light method of dealing with a serious subject will make his work very attractive to a good many readers.

It is unpardonable, however, when dealing with economic subjects that Mr. Wiman does not better inform himself. In a chapter entitled "Has the National Debt Ever Been Paid?" he takes up the steel rail trade and figures out that since 1865, \$17.60, the duty on steel rails, has been paid on the steel put down on 130,000 miles. Figuring at the rate of \$1800 a mile Mr. Wiman reaches the brilliant conclusion that there has been expended upon the railroads of the country for duty or royalty to a class a sum of about \$235,000,000. Mr. Wiman doubts whether the Government got one-tenth of this sum. It appears that the manufacturers "very kindly and generously distributed to the laboring classes and spent for raw

material half the amount realized, but the other half, the royalty of \$17.60 per ton, went into the pockets of the patriotic manufacturers." In other words, the steel rail manufacturers have, since 1865, pocketed a little more than \$100,000,000. Why did they stop in their extortions at the tonnage required for new roads? An enormous tonnage has been put down for renewals. Did they not exact their \$17.60 per ton on that too? Considering the fact that a number of them failed during this process of assimilation of \$100,000,000, the remaining few must have absorbed the greater part of this sum. In spite of this, one of the oldest and largest concerns went into the hands of receivers this year. Where did their share of the untold millions go to?

Seriously, it is difficult to conceive how an intelligent business man can do such criminal blundering. There has been no time during the last 20 years when the difference between the price of American rails and of foreign rails was equal to the duty; or in other words, American rail manufacturers have never had a chance, even had they desired it, to make the selling price of their rails as high as the sum of the foreign price and the duty. In the same chapter Mr. Wiman makes the statement that steel rails to-day can be had in England for about \$14 per ton. As a matter of fact, the lowest price of which we have heard is £3 10/, equivalent to \$17.

It is quite evident that Mr. Wiman depends for his facts upon the reports occasionally printed in the daily press. Thus, in a chapter entitled "Combination Upon Combination," he swallows whole the story that the principal men in the Standard Oil Company have consolidated the iron ore interests of Lake Superior, "a consolidation involving \$100,000,000 in value." We need hardly recall to our readers the fact that this much talked of consolidation takes care of only a number of properties in the Mesaba range, while the famous older ranges, the Marquette, Menominee and Gogebic, are still controlled by the same interests which have been the producers for years. We hold that Mr. Wiman has no right to give whatever weight his statements may possess to the perpetration of falsehoods like those referred to. He may be pardoned when he alludes to Andrew Carnegie as "the genial Scot who is playing such a successful 'star engagement' before the American people," because that is a matter between himself and another individual, but he has no right to prejudice great interests by unpardonable slovenliness in the examination of facts.

The Board of Railroad Commissioners of the State of Missouri in their eighth annual report state that they do not think any material increase in the railroad mileage of that State can be reasonably looked for the coming few years. It is true there are large areas in the State totally unprovided with railroad facilities, but these sections are generally but sparsely settled and present physical difficulties in the way of railroad construction which will be hard to overcome within a reasonable limit of cost. The day of speculative railroad construction seems to have passed, and where it cannot clearly be demonstrated that a projected line will be fairly remunerative the capital necessary for its construction cannot be had. It is not probable that railroads in the future will be built in Missouri

in advance of actual requirements. There are a few lines in the State for which extensions seem to be necessities, and these extensions may be built, but the commissioners do not think the construction of independent new lines can be expected to any great extent.

CONTENTS.

	PAGE.
The Norwalk Double Compound Air Compressor. Illustrated.....	789
Launch of the Battle Ship "Oregon"....	791
Single Boiler Punch Machine. Illus....	792
The Riedler Compressor.....	792
The Sague Galvanizing Machine. Illus..	793
World's Fair Notes.....	794
San Francisco News.....	797
Labor Troubles at Apollo, Pa.....	798
Photographing Colors.....	798
Treasury Decisions.....	798
The Harrington Special Foundry Crane. Illustrated.....	799
Progress in Foundry Practice.....	799
Power House Engines for Electric Railways.....	800
The Tornado Fan Blower. Illustrated...	801
Use of Storage Batteries in Electric Generating Stations.....	801
Washington News.....	802
The Jaques Tinning Pot. Illustrated....	803
Speed Premium for War Vessels.....	803
The Week.....	804
Trade Publications.....	804
Editorials:	
The Outlook.....	805
Engineers and Mechanics in the Navy..	805
Non-Union Men by Compulsion.....	805
Shop Transportation.....	806
Correspondence.....	806
Obituary.....	806
Induced Draft in Marine Boilers.....	806
Manual Training Schools.....	807
Manufacturing:	
Iron and Steel.....	808
Machinery.....	808
Hardware.....	809
Miscellaneous.....	809
Trade Report:	
Philadelphia.....	810
Cincinnati.....	810
Pittsburgh.....	811
St. Louis.....	811
Chicago.....	812
New York.....	813
British Iron and Metal Markets....	813
Metal Market.....	813
Financial.....	814
The M. C. Bullock Mfg. Company.....	815
Personal.....	816
Patent and Trade-Mark Laws.....	816
The Evolution of the Nail.....	817
Test of Fire-Resisting Materials.....	817
Hardware:	
Condition of Trade.....	818
Notes on Prices.....	820
Price-Lists, Circulars, &c.....	821
How to Keep the Store Neat and Clean.	821
Local Hardware Associations.....	822
Trade Items.....	822
Horseshoe Rack. Illustrated...	823
Selling at a Loss.....	823
A Hardware Sign. Illustrated.....	824
The Atha Tool Company's Catalogue...	824
It Is Reported.....	824
Paints and Colors.....	825
The Star Steel Tank Heater. Illus. ...	826
The Lightning Quick Acting Bench Vise. Illustrated.....	826
Streeter's Pot Scraper. Illustrated...	826
McGuire's Edging Shears. Illustrated.	826
Combination Circular Sawing Machine. Illustrated.....	827
Change Gatherer. Illustrated.....	827
"Just Enough" Improved Brass Nails. Illustrated.....	828
New Publications.....	828
Current Hardware Prices.....	829
Current Metal Prices.....	836

Current Hardware Prices.

NOVEMBER 1, 1893.

Note.—The quotations given below represent the Current Hardware Prices which prevail in the market at large. They are not given as manufacturers' prices, and manufacturers should not be held responsible for them. In cases where goods are quoted at lower figures than the manufacturers name, it is not stated that the manufacturers are selling at the prices quoted, but simply that the goods are being sold, perhaps by the manufacturers, perhaps by the jobbers at the figures named.

The character @ is used to indicate a range of price; thus discount 50&10@50&10&5 % signifies that the goods in question are sold at prices ranging from discount 50 and 10 % to discount 50 and 10 and 5 %.

Adjusters, Blind—

Domestic \$ doz \$3.00, 33%&10%
Excelsior \$ doz \$10.00 50&10&2%
North's list net @ 10%
Zimmerman's—See Fasteners Blind.

Ammunition—See Caps, Cartridges, &c.

Anvils—

Eagle Anvil, 10 lb 15&15&5%
Peter Wright's 11&11%
Armstrong's Mouse Hole 10%&11%
Am. Wrought, Horseshoe brand, 11&11%
Trenton 10&10%
Wilkinson's 10%&11%
Moore & Barnes Mfg. Co. 33%&5%

Anvil Vise and Drill—

Millers Falls Co., \$18.00 20%
Cheney Anvil and Vise 25%
Allen Anvil and Vise \$3.00 40&10%
Star 45&5%

Apple Parers—See Parers Apple, &c.

Augers and Bits—

Common Augers and Bits 70&70&10%
Boring Machine Augers 70&70&10%
Car Bits, 12 in. twist 50%
Russell Jennings' Augers and Bits, 25&10%
Jennings' Pattern Car Bits 40%
Jennings' Pattern Auger Bits 60%
Snell's Bits 60&5%
C. E. Jennings & Co., No. 10, extension
lip 40%
C. E. Jennings & Co., No. 30 60%
C. E. Jennings & Co. Auger Bits, 1/2 set,
32% quaters, No. 5, \$5; No. 30, \$3.50, 25%
Lewis' Patent Single twist 45%
Pugh's Black 20%
Pugh's Jennings Pattern 30%
L'Hommedieu Car Bits 15&10%
Forstner Pat. Auger Bits 15%
Cincinnati Bell-Hangers' Bits 30&10

Bit Stock Drills—

Morse Twist Drills 50&10&5%
Standard 50&10&5%
Cleveland 50&10&5%
Syracuse, for metal 50&10%
Syracuse, for wood (wood list), 30&10%
Cincinnati, for wood 30&10%
Cincinnati, for metal 45&10%

Expansive Bits—

Clark's small, \$18; large, \$28. 35&35&10%
Ives' No. 4, \$ doz. \$60 40%
Swan's 40%
Stearns, No. 1, \$26; No. 2, \$18 35&40%
Stearns' No. 2, \$48 20%

Gimlet Bits—

Common \$ gross \$2.75&\$3.25
Diamond \$ doz \$1.25 40&10%
Bee 25&25&5%
Double Cut:
Shepardson's 45&45&10%
Ct. Valley Mfg. Co. 30&10%
Hawthell's \$ gro., \$10.00, 40&10%
Douglass' 40&10%
Ives 60&60&10%

Hollow Augers—

Ives' 33%&33%
French, Swift & Co. (Beecher) } 10%
Douglass' 10%
Bonney's Adjustable, \$ doz \$48 50%
Stearns' 20&10%
Ives' x-pansive, each \$4.50 50&5%
Universal Expansive, each \$4.50 20%
Wood's 25&25&10%
Cincinnati Adjustable 25&10%
Cincinnati Standard 25&10%

Ship Augers and Bits—

L'Hommedieu's 15&10&15&10&5%
Watrous' 25&25&10%
Snell's 25&25&10%
Snell's Ship Auger Pat'n Car Bits
15&10&15&10&5%

Awl Hafts—See Hafts, Awl.

Awls—

Awls, Sewing, Common \$ gr. 85¢&90¢
Awls, Should. Peg \$ gr. \$1.50&\$1.55
Awls, Pat. Peg \$ gr. 85¢&38¢
Awls, Shouldered Brad. \$ gr. \$1.30&1.40
Awls, Handled, each \$4.50 \$3.00
Awls, Handled Scratch, \$ gr. \$4.00&\$4.50
Awls, Socket Scratch, \$ doz. \$1.10&\$1.20

Awl and Tool Sets—See Sets, Awl and Tool.

Axes—

First quality, best brands, \$7.00 \$7.50
First qual., other brands 6.50 7.00
Second quality 5.50 6.00

Axle Grease—See Grease, Axle.

Axles—

No. 1, 3 1/2" & 4 1/2", No. 2, 5" & 6" }
Nos. 7 to 14 60&10% } 3% cash
Nos. 15 to 28 47%
Nos. 19 to 22 70%
Concord Axles, loose collar 4 1/4¢&6¢
Concord Axles, solid collar 5 1/4¢&7¢
National Tubular Self Oiling 38 1/4¢&5 1/2¢

Bag Holders—See Holders, Bag.

Balances—

Spring Balances:
No. 2000 20 30 40%
Challinor, \$ doz. \$0.80 0.95 1.75 net
Challinor Straight Balances 40%
Challinor Circular Balances 50&10%

Barb Wire—See Wire, Barb.

Bars—

Crow—
Cast Steel \$ doz \$ 3 1/2¢
Iron, Steel Points \$ doz \$ 3 1/2¢

Basins, Wash—

Standard Fiberware, No. 1, 10 1/2 in., \$1.80;
12 inch, \$2.00; 13 1/2 inch, \$2.50; 15 inch,
\$3.00.

Beams, Scale—

Scale Beams, List Jan. 12, '82. 50&10%
Challinor's No. 1 40%
Challinor's No. 2 50%
Custer's 33%&5%

Beaters—Egg—

Dover \$ doz \$1.00&\$1.20
Duplex (Standard Co.) \$ doz \$1.00
Dover (Standard Co.) \$ doz \$1.00
Duplex Extra Heavy (Standard Co.) \$ doz \$3.50
Bryan's \$ gross \$14.00
Double (H. & R. Mfg. Co.) \$ gro., No. 1, \$15.00; No. 2, \$36.00
Easy (H. & R. Mfg. Co.) \$ gro \$12.00
Triple (H. & R. Mfg. Co.) \$ gro \$15.50
Spiral \$ gro \$4.25 & \$4.50
Improved Acme (H. & R. Mfg. Co.) \$ gro. \$9.00
Silver & Co. \$ doz \$5.50

Culinary—

Keystone, P. D. & Co., Each, No. 1, \$1;
No. 2, \$2 20%

Bells—

Cow—
Common Wrought 60&10%
Western, Sargent's list 70&10%
Kentucky, "Star" 20&10%
Kentucky, Sargent's list 70&10%
Kentucky Durham 70&10%
Dodge, Brooks' Kentucky 70&70&10%
Texas Star 50&10&50&10&5%

Door—

Gong, Abbe's 33%&10%
Gong, Yankee 45&10%
Gong, Barton's 40&10%
Crane, Brooks' 50&10&2%
Crank, Cone's 10%
Crank, Connel's 20&10%
Lever, Sargent's 60&10%
Lever, Taylor's Bronzed or Plated net
Lever, Taylor's Japanned 25&10%
Lever, R. & E. Mfg. Co.'s 50&10%
Pull, Brook's 50&10&2%

Electric—

Wollensak's 20%
Bigelow & Dowse 20%

Hand—

Light Brass 70&10&70&10&5%
Extra Heavy 70%
White 70%
Silver Chime 33%&10%
Globe Cone's Patent 25&10&35%

Miscellaneous—

Call 45&50%
Farm Bells \$ doz \$3&\$4
Steel Alloy Church and School Bells, 40%

Bellows—

Blacksmiths' 60&10&5&60&10&10%
Molders' 40&10&50%
Hand Bellows 40&10&50%

Belting, Rubber—

Common Standard 75&75&10%
Standard 70&5&70&10%
Extra 60&10&60&10&10%
N.Y.B. & P. Co., Carbon 60&60&5%
N.Y.B. & P. Co., Diamond 60&60&5%
N.Y.B. & P. Co., Para 40&40&5%

Bench Stops—See Stops, Bench

Benders and Upsetters, Tire—

Stoddard's Lightning Tire Upsetters 15%
Detroit Perfected Tire Bender 15%
Green River Tire Benders and Upsetters 20%

Bits—

Auger, Gimlet, Bit Stock Drills, &c.,
see Augers and Bits.

Bit Holders—See Holders.

Blind Adjusters—See Adjusters, Blind.

Blind Fasteners—See Fasteners, Blind.

Blind Staples—See Staples, Blind.

Blocks—

Cleveland Block Co., Mal. Iron, 60&60&10%
Moore's Novelty, Mal. Iron 50%
Sure Grip Steel Tackle Blocks 25%
See also Machines, Hotelling.

Boils—

Carriage, Machine, &c.—

Com. list June 10, '84 80&80&7%
Genuine Eagle, Norway, list Oct. '84 80%
Eagle, Norway, list Oct. '84 80&80&10%
Phila. pattern, list Oct. 7, '84 80%
R.B. & W., old list 70%
Machine, list Jan. 1, 1890 80&10%
Bolt Ends, list Jan. 1, 1890 80&10%

Door and Shutter—

Cast Iron Barrel, Square, &c. 70&10%
Cast Iron Shutter Bolt 70&10%
Cast Iron Chain (Sargent's list) 65&10%
Ives' Patent Door Bolts, 60&10&60&10&5%
Wrought Barrel 70&10&75%
Wrought Square 70&10&75%
Wrt Shutter, all iron, Stanley's 60&10&60&10%
Wrt Shutter, Brass Knob 50&50&5%
Wrt Shutter, Sargent's list 60&10%
Wrt Sunk Flush, Sargent's list 60&10%
Wrt Sunk Flush, Stanley's list, 50&10&5%
Wrt B. K. Flush, Common 55&10%

Stove and Plow—

Stove 60&10&60&10&10%
Plow 60&10&50&60&10&10%
R. B. & W., Plow 55%

Tire—

Common, list Feb. 28, '83 65&65&5%
Port Chester Bolt and Nut Company 65%
Empire list Feb. 28, '83 65%
Keystone, Philadel., list Oct. '84 80%
Norway, Phila., list Oct. '84 75%
American Screw Company 75%
Norway, Phila., list Oct. 16, '84 75%
Eagle, Phila., list Oct. 16, '84 80%
Philadel., list Oct. 16, '84 80%
Bay State list Feb. 28, '83 65%
R. B. & W., Philadel., list Oct. 16, '84 80%

Borers, Tap—

Common and Ring 20&10%
Ives' Tap Borers 33%&5%
Enterprise Mfg. Co. 33%&35%
Clark's 33%&35%

Borax—

Per doz 9%&10%&5%

Boring Machines—See Machines, Boring.

Bow Pins—See Pins, Bow.

Boxes, Wagon—

Per doz 2%&4%

Boxes, Miter.

Spiker's Excelsior, 3 in. \$7.50, 4 in. \$8.50, 5 in. \$15.00, 6 in. \$15.00 20%

Braces—

Anchor, 2 1/2 in. Brace and Tool Co. 60&10%
Nos. 10, 12, 20 60&10%
Nos. 11, 21, 24, 27 70&10%
Nos. 22, 23, 25 60&10&5%
Nos. 13, 26, 36, 37 70&10&5%
Amidon's 75&10&80%
Barker's Imp'd Plain 65&10&70%
Barker's Imp. Nickeled 75&10&80%
Ratchet 60%
Eclipse Ratchet 40&40&10%
Globe Jawed 40&40&10%
Corner Brace 40&40&10%
Universal, 8 in., \$2.10; 10 in. \$2.25
Buffalo Ball \$1.10&\$1.15
Saxton's 50&10%
Barker's Imp. Polished 75&10&80%
Barker's Imp. Nickeled 65&10&70%
Ratchet, Polished 50&10&60%
Ratchet, Nickeled 40&40&60%
Buffalo Ball net, \$1.10&\$1.15
Barkholme's 60&10&60&5%
Nos. 25, 27 and 30 70&70&5%
Nos. 117, 118, 119 \$1.00&\$1.10
Common Ball, American \$1.00&\$1.10
Fray's Genuine Spofford's 50&50&10%
Fray's Nos. 70 to 120, 81 to 123, 207 to 414 50&10%
Ives' New Haven Novelty 70&70&5%
New Haven Ratchet 60&5&60&10%
Barber Ratchet 60&5&60&10%
Barber's 60&5%
Spofford 60&5&60&10%
P. S. & W. Co., Peck's Patent 60%
Rose & Johnson 50%
Davis Patent 50&10%

Brackets—

Shelf, plain, 65&70%
Sargent's list 60&10&70&10%
Shelf, fancy, 70&70&10%
Sargent's list 70&70&10%
Other makes at a wide range of prices.
Bradley Shelf Brackets 70&10%

Bright Wire Goods—See Wire.

Broilers—

Hen's Self, 1/2 inch 9 10 9x11
Basting, \$ doz. \$4.50 5.50 6.50
New Haven 60%
Wire Goods Co. 65&10%
Morgan Odorless \$ doz. \$12, 60%
Queen City 33%&5%

Buckets, Well—

Galvanized:
Hill's \$ doz. 12 qt. \$4.25; 14 qt. \$5.25
Iron Clad \$ doz. 14 qt. \$4.25&\$4.50
Helwig's Flat Iron Band \$3.75
Helwig's Wired Top \$ doz \$4.00

Bull Rings—See Rings, Bull.

Butcher's Cleavers—See Cleavers, Butchers.

Butts—

Brass—
Wrought Brass 80&60&10%
Cast Brass, Tiebout's 50%
Cast Brass, Fast 33%&10%
Cast Brass, Loose Joint 33%&10%

Cast Iron—

Fast Joint, Narrow 50&10&5&60%
Fast Joint, Broad 50&10&60%
Loose Joint 75&5%
Loose Joint, Japanned 75&10%
Loose Joint, Jap. with Acorns 75&10%
Parliament Butts 75&10%
Mayer's Hinges 75&10%
Loose Pin, Acorns 75&10%
Loose Pin, Acorns, Japanned 75&10%
Loose Pin, Acorns, Japanned, Plated Tips 75&10%

Wrought Steel—

Fast Joint, Narrow 50&10&5&60%
Fast Joint, Broad 50&10&60%
Fast Joint, Broad 50&10&60%
Loose Joint, Broad 50&10&60%
Table Butts, Back Flaps, &c. 50&10&60%
Inside Blind, Regular 50&10&60%
Inside Blind, Light 50&10&60%
Loose Pin 50&10&60%
Bronzed Wrought Butts 50&10&60%

Cages, Bird—

Hendryx, Brass or Enameled 50&10%
Hendryx, Wood 40&10%

Calipers—See Compasses.

Calks, Toe—

Gautier, One Prong, Blunt 5 1/4¢&6¢
Burke's One Prong, Blunt 5 1/4¢&6¢
Burke's, Two Prong, Blunt 7 1/4¢&8¢
Burke's, One Prong, Sharp 6 1/4¢&7¢

Can Openers—See Openers, Can.

Cans, Milk—

S. S. & Co.: 5-gal. \$3.00; 8-gal., \$4.40;
10-gal., \$4.75 each 40&10

Cans, Oil—

Galvanized Blue Band, 5 gal., Tip-Top, \$ doz., \$12.00
Galvanized Blue Band, 5 gal., Faucet, \$ doz., \$8.00
Galvanized Blue Band, 1 gal., \$ doz. \$2.25
Glass Oil, Friend \$ doz. \$2.75

Caps—

Percussion—

Hicks & Goldmark's and Union Metallic Cartridge Co. \$ 1000
F. L. Waterproof, 1-10's 35¢&37¢
E. B. Trimmed Edge, 1-10's 47¢&50¢
E. B. Grnd. Edge, Cent. Fire, 1-10's 47¢&50¢
Musket. Waterproof, 1-10's 50¢&53¢
G. D. 27¢&30¢
S. B. Genuine Imported 56¢&58¢
Eley's E. B. 56¢&58¢
Eley's D Waterproof, Central Fire. \$1.60

Primers—

Berdan Primers, \$1.00 2%
B. L. Caps (Sturtevant Shells) \$1 00 2%
All other Primers, \$1.20 2%

Cards—

Watson's Cotton, Wool, Horse and File, list January 28, 1891 25%

Carpet Stretchers—

See Stretchers, Carpet.

Cartridges—

Rim Fire Cartridges 50&5&2%
Rim Fire Military 15&2%
Cent. Fire, Pistol and Rifle 25&5&2%
Cent. Fire, Military and Sporting 15&5&2%
Blank Cartridges, except 22 and 32 cal., additional 10% to above discounts
Blank Cartridges, 22 cal., \$1.75 2%
Blank Cartridges, 32 cal., \$3.50 2%
Primed Shells and Bullets 15&5&2%
B. B. Caps, Round Ball, \$1.75 2%
B. B. Caps, Con. Ball, Swgd., \$2.00 2%

Carpet Sweepers—

See Sweepers, Carpet.

Casters—

Bed \$ Brass 55¢&55&10%
Piste \$ Others 60¢&60&10%
Shallow Socket 40&10%
Deep Socket 40&10%
Martin's Patent (Phoenix) 45¢&10&50&10%
Tucker's Patent, low list 45%
Payson's Anti-Friction 70¢&70&10%
Payson's Truck 60¢&60&10%
Yale Casters, low list 45%
Yale, Gem 70%
Giant Truck Casters 35%
Stationary Truck Casters 50&10%
Socket Truck Casters 50&60&10%
Gwinner's Common Sense 45%
Gwinner's Hercules 45%

Cattle Leaders—

See Leaders, Cattle.

Cement—

Victor Elastic 5 lb pails \$ 5¢

Chalk Lines—See *Lines*.
Cocks, Door—
 Unity 50%
Chisels—
Socket Framing and Firmer
 P. S. & W. 75%
 New Haven 75%
 Witherby 75%
 Mix 75%
 Ohio Tool Co. 75%
 Douglass 75%
 Buck Bros 75%
 Merrill 60%
 L. & J. White 30%
Tanged and Miscellaneous
 Tanged Firmers 50%
 Butchers' \$4.75 to \$5.00
 Spear & Jacksons \$5 to \$6
 Buck Bros 30%
 Cold Chisels, fair quality, # D 14%
Chucks—
 Beach Pat. each, \$8.00 20%
 Morse's Adjustable, each, \$7.00 to \$8.00 20%
 Danbury each, \$6.00 to \$8.00 20%
 Syracuse, Balz Pat. 25%
 Graham Patent 33%
 Skinner's Patent Chucks 33%
 Combination Lathe Chucks 33%
 Universal Lathe Chucks 40%
 Independent Lathe Chucks 40%
 Drill Chucks 15%
 Union Mfg. Co. Victor \$8.50, 25%
 Combination 40%
 Universal 40%
 Independent 40%
Churns—
 Tiffin Union, each, 5 gal. \$3.25; 7 gal. \$3.75; 10 gal. \$4.25.
 McDermaid Star Barrel Churn, each 6 gal. \$2.60; 10 gal. \$2.75; 15 gal. \$3.00; 20 gal. \$3.25.
Clamps—
 R. I. Tool Co.'s Wrought Iron 25%
 Adjustable, Cincinnati 15%
 Adjustable, Hammers 15%
 Adjustable, Stearns' 30%
 Stearns' Adjustable Cabinet and Corner 30%
 Cabinet, Sargent's 70%
 Carriage Makers', Sargent's 75%
 Carriage Makers', P. S. & W. Co. 40%
 Eberhard Mfg. Co. 40%
 Warner's 40%
 Saw Clamps, see Vises, Saw Filers'.
 Carpenter's, Cincinnati 25%
 Barnes' Machinists' Clamps 33%
Cleavers, Butchers'—
 Bradley's 25%
 L. & J. White 25%
 Beatty's 40%
 New Haven Edge Tool Co.'s 40%
 P. S. & W. 33%
 Foster Bros. 30%
 Schulte, Lohoff & Co. 40%
Clips—
 Norway, Axle, 1/4 & 5-16 55%
 2d grade Norway Axle, 1/4 & 5-16 55%
 Superior Axle Clips 65%
 Norway Spring Bar Clips, 5-16 65%
 Wrought Iron Felloe Clips 5%
 Steel Felloe Clips 5%
 Baker Axle Clips 25%
Cloth and Netting, Wire—
 See *Wire*, &c.
Cockeyes 50%
Cocks Brass—
 Hardware List (Globe, Kerosene, Lever Bibbs, Racking, &c.) 60%
Coffee Mills—See *Mills*, *Coffee*.
Collars Dog—
 Chapman Mfg. Company, new list 40%
 Medford Fancy Goods Co. 40%
 Embossed, Gift, Pope & Stevens' list 30%
 Leather, Pope & Stevens' list 30%
 Brass, Pope & Stevens' list 40%
Combs, Curry—
 Fitch's 50%
 Rubber, per doz. \$10.00 25%
 American Curry Comb Co. 33%
 Kohler's Magic Oscillating, # doz. \$2.00
 Kohler's Humane # doz. \$1.75
Compasses, Dividers &c.
 Compasses, Calipers, Dividers, 70%
 Dividers 65%
 Compasses 60%
 Calipers, Inside or Outside 65%
 Calipers, Wing 60%
 Calipers, Double 65%
 Calipers, Call's Patent Inside 65%
 Excelsior 60%
 Stevens & Co.'s 25%
 Starrett's 25%
 Spring Calipers and Dividers 25%
 Lock Calipers and Dividers 25%
 Combination Dividers 25%
Coolers, Water—
 S. S. & Co.: 2-gal. \$2.00; 3-gal. \$2.50; 4-gal. \$2.75; 6-gal. \$3.40 each. 33%
Coopers' Tools—
 See *Tools*, *Coopers*.
Cord—
Sash—
 Common # D. 8%
 Patent, good quality # D. 10%
 White Cotton Braided, fair # D. 23%
 Common Russia Sash # D. 12%
 Patent Russia Sash # D. 13%
 Cable Laid Italian Sash # D. 10%
 India Cable Laid Sash # D. 11%
 A quality, White, 50# 25%
 A quality, Drab, 55# 25%
 B quality, White, 30# 10%
 B quality, Drab, 35# 10%
 Sylvan Spring, Extra Braided, White, 34# 39%
 Sylvan Spring, Extra Braided, Drab, 39# 39%
 Samper Idem, Braided, White, 20# 20%
 Egyptian, India Hemp, Braided, 20# 20%
 Massachusetts, White, 20# 20%
 Braided, White Cotton # D. 37%
 Braided, Drab Cotton # D. 42%
 Braided, Italian Hemp # D. 40%
 Braided, Linen # D. 50%
 Tere's solid Braided—
 Hercules, White # D. 25%
 Hercules, Drab # D. 30%
 Economy, Drab # D. 27%
 Economy, White # D. 22%
 Ossawan Mills—
 Braided, Giant, White, # D. 30# 20%
 Braided, Giant, Drab and Fancy, # D. 30# 10%

Braided, Crown White, # D. 50# 50%
 Braided, Crown Drab and Fancy, # D. 55# 30%
Wire Picture—
 Braided or Twisted 80%
Corkscrews—See *Screws*, *Cork*.
Corn Knives and Cutters—
 See *Knives*, *Corn*.
Crackers Nut—
 Table (H. & B. Mfg. Co.) 40%
 Blake's Pattern, # doz. \$2.00 10%
 Turner & Seymour Mfg. Co. 50%
 Acme 50%
 Japanned, # gro. \$30 10%
 Nickel Plated, # gro. \$30 10%
Cradles—
 Grain 50%
Crays—
 White Crays, # gross 70%
 D. M. Stewart Mfg. Co. 70%
 Metal Workers', # gross 1.75 25%
 Rolling Mill, # gross 2.50 25%
 Railroad, # gross 2.00 25%
 Soapstone Pencils, # gross 1.00 25%
 See also *Chalk*.
Creamery Pails—See *Pails*, *Creamery*.
Crow Bars—See *Bars*, *Crow*.
Curry Combs—
 See *Combs*, *Curry*.
Curtain Pins—
 See *Pins*, *Curtain*.
Cutters—
Meat—
 Dixon's, # doz. 40%
 Nos. 1 2 3 4 5
 \$14.00 \$17.00 \$19.00 \$30.00
 Woodruff's, # doz. 40%
 Nos. 100 150
 \$15.00 \$18.00
 Hale's, # doz. 11 12 13
 Nos. \$27.00 \$33.00 \$45.00
 American 35%
 Nos. 1 2 3 4 5
 Each \$5 \$7 \$10 \$25 \$50 \$80
 Enterprise 12 22 32 42
 Each \$3 \$2.50 \$4 \$6 \$15
 Little Giant, # doz. 40%
 Nos. 305 310 312 320 322
 \$35.00 \$48.00 \$44.00 \$72.00 \$68.00
 Triumph No. 505, # doz. \$21.00 25%
 Miles' Challenge, # doz. \$45 to \$48 10%
 Nos. \$22.00 \$30.00 \$40.00
 Home No. 1, # doz. \$26.00 55%
 Draw Cut, each:
 Nos. 5 2 6 8
 \$50 \$75 \$80 \$225 20%
 Beef Shavers (Enterprise) 20%
 Chabourn's Smoked Beef Cutter, # doz. \$66.00
Slaw and Kraut—
 Tucker & Dorsey Mfg. Co.:
 Slaw Cutters, 1 Knife, # gross \$21.00
 Slaw Cutters, 2 Knife, # gross 30.00
 Kraut Cutters 40%
Tobacco—
 Champion 20%
 All day 20%
 Nashua Lock Co.'s, # doz. \$18.00 50%
 Wilson's 55%
 Sargent's # doz. \$24.00 55%
 Acme # doz. \$20.00 40%
Washer—
 Smith's Pat. # doz. \$12.00 20%
 Johnson's # doz. \$11.00 33%
 Ketchum's, # doz. \$14.00 55%
 Appleton's # doz. \$18.00 60%
 Bonney's 30%
 Cincinnati 25%
Diggers, Post Hole, &c.—
 Samson, # doz. \$34.00 25%
 Fletcher Post Hole Augers, # doz. \$36.00 20%
 Eureka Diggers, # doz. \$12.00 to \$13.00 20%
 Vaughan's Post Hole Auger, # doz. \$8.50 to \$9.50
 Kohler's Little Giant # doz. \$18.00
 Kohler's Hercules # doz. \$14.00
 Kohler's Invincible # doz. \$12.00
 Kohler's New Champion # doz. \$8.00
 Scheider # doz. \$18.00
 Cronk's Post Bars, # doz. \$60 to \$50 10%
 Gibb's Post Hole Digger # doz. \$15.00
 Gibb's National # doz. \$12.00
 Gibb's Columbia # doz. \$13.00
 Gibb's Imperial # doz. \$7.50
 Shimer's Hollow Handle # doz. \$24.00
 Gem, Improved # doz. \$9.00 to \$10.00 net
Dividers—See *Compasses*.
Dog Collars—See *Collars*, *Dog*.
Door Checks—
 See *Checks*, *Door*.
Door Springs—
 See *Springs*, *Door*.
Drawers—
 Money, # doz. \$18 to \$20
 Wadell's Improved, # doz. \$15.00
Drawing Knives—
 See *Knives*, *Drawing*.
Drills and Drill Stocks—
 Blacksmiths' Self-Feeding, each \$7.50, 20%
 Breast, S. & W. 40%
 Breast, Wilson's 40%
 Breast, Millers Falls each \$3.00, 25%
 Breast, Bartholomew's each \$2.50
 Ratchet, Merrill's 20%
 Ratchet, Ingersoll's 25%
 Ratchet, Parker's 20%
 Ratchet, Whitney's 20%
 Ratchet, Weston's 20%
 Ratchet, Moore's Triple Action 25%
 Ratchet, Curtis & Curtis 30%
 Whitney's Hand Drill, Plain, \$11.00;
 Adjustable, \$12.00 20%
 Automatic Boring Tools \$1.75 to \$1.85
 Chicago Automatic Drill 20%
 Goodell Automatic Drills 40%
Twist Drills—
 Cleveland 50%
 Diamond, W. & B. 50%
 Graham's Pat. Groove Shank 50%
 Morse 50%
 New Process 50%
 Syracuse (Metal Use) 50%

Drill Bits or Bit Stock
 Drills—See *Augers* and *Bits*.
Drill Chucks—See *Chucks*.
Dripping Pans—
 See *Pans*, *Dripping*.
Drivers, Screw—
 Douglass Mfg. Co. 20%
 Dilation's 50%
 Buck Bros 30%
 Stanley R. & L. Co.'s
 No. 84, Varnished Handles 65%
 No. 8 70%
 Sargent & Co.'s
 No. 1, Forged Blade 60%
 Nos. 20, 40 and 60 65%
 P. S. & W. 70%
 Knapp & Cowles 60%
 No. 1 60%
 No. 2 60%
 No. 3 60%
 Nos. 4 and 00, Acme and Ideal 50%
 60%
 60%
 25%
 Stearns' 25%
 Gay & Parsons 35%
 Champion 25%
 Clark's Socket and Patchet 30%
 Ellrich's Socket and Patchet 25%
 Allard's Spiral, new list 25%
 Kolb's Common Sense, # doz. \$6.00
 Syracuse Screw-Drive Bits 30%
 Screw Driver Bits, Farr's, # doz. 50%
 Fray's Hol. H. die Sets, No. 3, \$12.00 25%
 Cincinnati 25%
 Brace Screw Drivers 25%
 Buck Bros' Screw Driver Bits 27%
 Goodell's Automatic 60%
 Mayhew's Black Handle 60%
 Mayhew's Monarch 45%
 C. T. Williamson Wire Novelty Co. 50%
Egg Beaters—See *Beaters*, *Egg*.
Egg Poachers—
 See *Poachers*, *Egg*.
Electric Bell Sets—
 See *Bells*, *Electric*.
Emery—No. 4 to No. 54 to Flour CF.
 48 gr. 150 gr. F.F.F.
 48 grs. # D. 45# 5 # 2#
 48 grs. # D. 45# 5 # 2#
 48 grs. # D. 5 # 5# 3 #
 10 # cans, 10 #
 in case 6 # 6# 5 #
 10 # cans, less than 10 # 10 # 7#
Enameled and Tinned Ware—See *Ware*, *Hollow*.
Escutcheon Pins—
 See *Pins*, *Escutcheon*.
Escutcheons—
 Door Lock Same dis. as Door Locks.
 Brass Thread 60%
 Wood 25%
Expanded Metal—
 List No. 5.
 Lathing 10%
 Fencing, Painted Sheets 20%
 Netting, Painted Sheets 20%
 Door Mats, Galvanized 25%
 Window Guards, Paneled 15%
 Tree Guards, Paneled 15%
Extractors, Lemon Juice—
 See *Squeezers*, *Lemon*.
Fasteners, Blind—
 Mackrell's, # doz. \$1.00 20%
 Van Sand's Screw Pat. \$15 # gr. 60%
 Van Sand's Old Pat. \$15 # gr. 55%
 Austin & Eddy No. 2008 # gr. \$9.00
 Security Gravity # gr. \$9.00
 Zimmerman's 50%
Faucets—
 Fenn's 40%
 Fenn's Cork Stops 33%
 Star 60%
 Frary's Pat. Petroleum 80%
 B. & L. B. Co.
 West's Lock, Open and Shut Key 50%
 Star Metal Plug, new list 60%
 Lockport, Metal Plug, reduced list 50%
 Metallic Key, Leather Lined 60%
 Cork Lined 70%
 Burnside's Red Cedar 50%
 Burnside's Red Cedar, bbl. lots 60%
 Peerless Best Block Tin Key 40%
 IXL, 1st quality, Cork Lined 50%
 Diamond Lock 40%
 Perfection, Fla. Red Cedar (in boxes) 40%
 Boss Metallic Key 50%
 Reliable Cork Lined 80%
 C. C. West's Pattern Cork Lined 60%
 No Brand, Red Cedar (in bbls.) 50%
 Western Pattern Metal Key 40%
 No Brand Metal Key 60%
 Self Measuring 20%
 Enterprise, # doz. \$36.00 20%
 Lane's # doz. \$36.00 25%
Felloe Plates—
 See *Plates*, *Felloe*.
Fibre Ware—See *Ware*, *Fibre*.
Fifth Wheels—
 Derby and Cincinnati 45%
 Brewster 50%
Files—
Domestic—
 Nicholson Files, Rasps, &c. 60%
 Nicholson (X.F.) Files 60%
 Nicholson's Extra Pattern (Seconds) 75%
 American 65%
 G. & H. Barnett (Black Diamond) 60%
 Arcade 60%
 Eagle 60%
 Other makers, best brand 60%
 Second quality 70%
 Second quality 80%
 Heller's Horse Rasps 50%
 McCaffrey's Horse Rasps 50%
 Chelsea Horse Rasps, Hand Cut 50%
 Arcade Horse Rasps 60%
 Trojan Horse Rasps 60%
Imported
 Butcher Butcher's list, 20%
 Stubby Stubby's list, 20%

Fixtures Grindstone—
 Sargent's Patent 70%
 Reading Hardware Co. 80%
 P. S. & W. Co. 50%
 Moore's 55%
Fluting Machines—
 See *Machines*, *Fluting*.
Fluting Scissors—
 See *Scissors*, *Fluting*.
Fodder Squeezers—
 See *Squeezers*, *Fodder*.
Forks—
 Hay, Manure, &c. Asso. List, 70%
 Key, Manure, &c., Phila. List, 50%
 Plated, see Spoons.
Frames—Saw—
 White Vermont # gro. \$9.00 to \$10.00
 Red, Polished and Varnished # doz. \$1.50, 25%
Screen, Window and Door—
 Porter's Pat. Window and Door Frame 33%
 Warner's Screen Corner Irons 33%
 Stearns' Frames and Corners 25%
 Cortland 40%
 Phillips' Window Screen Frames 40%
 Bonanza Window Screens 50%
 Empire Fancy Screen Doors, # doz. \$12
Freezers Ice Cream—
 White Mountain 60%
 Granite State 65%
 Arctic 70%
 American 60%
 Buffalo Champion 65%
 Shepard's Lightning 65%
 Gem 65%
 Buzzard 60%
 Double Action Crown 60%
 Crown 60%
 Star 60%
 Peerless 60%
 Giant 60%
 Zero 70%
 Boss and Pat. 60%
 Keystone, F. D. & Co., each, \$ 50 20%
 Standard 60%
 Standard Double Action 60%
 Good Luck 65%
 Model 60%
 Confectioners' Machine 50%
Fruit and Jelly Presses—
 See *Presses*, *Fruit* and *Jelly*.
Fruit Pickers—
 See *Pickers*, *Fruit*.
Fry Pans—See *Pans*, *Fry*.
Funnels—
 Gersdorff's Perfection, Standard and Globe; Tin, 1 gro. 10% 2 to 5 gro. 20%
 20% 5 to 10 gro. 30%
 Copper, 1 to 6 doz. 15% 6 to 12 doz. 20%
 over 12 doz. 25%
Furnaces, Soldering—
 Burgess No. 3 Gas \$7.00
 Burgess No. 8 Gem, Copper reservoir \$3.50
 Clayton & Lambert No. 1 Fire-Pot, complete \$6.00
Fuse—Dis. 12% to 15% # m 1000 ft
 Common Hemp Fuse, for dry ground, \$2.70
 Common Cotton Fuse, for dry ground 2.85
 Single Taped Fuse, for wet ground. 3.85
 Double Taped Fuse, for very wet gr. 4.80
 Triple Taped Fuse, for very wet gr. 5.80
 Small Gutta Percha Fuse, for water. 7.50
 Large Gutta Percha Fuse, for water. 12.00
Gates Molasses—
 Stebbin's Pattern 30%
 Stebbin's Genuine 60%
 Stebbin's Tinned Ends 40%
 Lincoln's Pattern 70%
 Weed's 20%
 Boss, # doz.:
 No. 1, \$7; No. 2, \$8; No. 3, \$9; No. 4, \$10 60%
Gauges—
 Marking, Mortise, &c. 60%
 Starrett's Surface, Center and Scratch 25%
 Stanley R. & L. Co.'s Butt and Rabbit Gauge 20%
 Barrett's Comb, Roller Gauge # doz \$8.00 to \$8.50
 Hoague & Peck's Champion Gauge—
 With Scale # doz. \$5.00
 Without Scale # doz. \$4.00
 Wire, Wheeler, Madden & Co. 10%
 Wire, Morse's 25%
 Wire, Brown & Shupe's 10%
 Wire, P. S. & W. Co. 10%
Gimlets—
 Nail and Spike 50%
 Eureka Gimlets 80%
 Diamond Gimlets # gr \$5.00
 Double Cut, Shephardson's 45%
 Double Cut, Ives' 60%
 Double Cut, Douglass' 40%
Glue—
 Le Page's Liquid 25%
 Upton's Liquid 35%
 Improved Process 25%
 Dodd's Liquid Glue 25%
 See *Pots*, *Glue*.
Grease, Axle—
 Fraser's, 1 ckg # m 4# Pail # m 5#
 Fraser's, in boxes # gr \$9.50
 Dixon's Everlasting, in bxs. # doz 10 # \$1.20; 2 # \$2.00
 Lower grades, special brands # gr \$5.50 to \$7.00
 Axleline, tin boxes # gross \$12.00
 English Coach, wooden boxes # gross \$8.50
 English Coach, 5-m tin pails, # doz. \$3.50
 Tiger, wooden boxes # gross \$7.00
 Tiger, 6-m tin pails # doz \$2.85
Grindstones—
 Family, regular list 60%
 Family, Cleveland Stone 20%
Grindstone Fixtures—
 See *Fixtures*, *Grindstone*.
Gun Powder—See *Powder*.
Hack Saws—See *Saws*.
Halts, Awi—
 Sewing, Brass Fer. # gr \$1.75
 Pat. Sewing, Short # doz. \$4.50
 Pat. Sewing, Long # doz \$1.20
 Pat. Peg, Plain Top, # doz. \$4.45
 Pat. Peg Leather Top, # doz. \$4.50

Halters—

Covert's Rope, Jute.....60&10&10&25
Covert's Rope, 7-16 in. Jute.....70&25
Covert's Rope, 1/2 in. Hemp.....50&25
Covert's Adj. Rope Halters.....40&25
Covert's Hemp Horse and Cattle Ties.....60&10&25
Covert's Jute Horse Ties.....70&25
Covert's Jute Cattle Ties.....70&10&25
Covert's Adj. Web Halters.....35&5&25
Covert's Saddlery Works Halters.....35&25
Covert's Saddlery Works Horse and Cattle Ties.....55&25
Covert's Saddlery Works Handy V. Halters.....85&25

Hammers—

Handled Hammers—
Maydole's, list Dec. 1, '85.....25&10&85
Buffalo Hammer Co.....50&10
Hudson & Beckley.....50&10
Atha Tool Co.....40&10
Verree.....40&10
C. Hammond & Son.....40&10
Fayette R. Plumb.....40&10
Artisan's Choice, A. E. Nail.....40&10
Regular Y. & P. A. E. Nail.....60
Horseshoe Turning Hammers.....60
Other Hammers.....50&10
Cheney's Sledge.....40&10
Cheney's Machinist's & Riveting.....60&5
Magnetic Tack, Nos. 1, 2, 3, 1.25, 1.50 & 1.75.....30&10
Nelson Tool Works.....40&10
Warner & Nobles, new list.....25&10
Peck, Stow & Wilcox.....35&40
Sargent's.....40&10&10

Heavy Hammers and Sledges—

3 lb and under.....40&10
5 lb.....40&10
Over 5 lb.....40&10
Wilkinson's Smiths.....10&10&11&10

Handcuffs and Leg Irons—

See Police Goods.

Handles—

Cross-Cut Saw Handles—
Atkins', new list.....40
Champion.....15
Ely's Perfection.....40
Sensible.....40

Iron, Wrought or Cast—

Door or Thumb.....0 1 2 3 4
Per doz.....\$0.90 1.00 1.08 1.85 1.50
Roggin's Latches.....40
Bronze Iron Drop Latches.....40
Jap'd Store Door Handles—Nuts, 1.65; Plate, 1.10; no plate, \$0.88.....net
Barn Door.....40
Chest and Lifting.....70&70&10

Wood—

Saw and Plane.....40&10&50
Hammer, Hatchet, Axe, &c.....40
Brad Axl.....40
Hickory Firmer Chisel, ass'd.....40
Hickory Firmer Chisel, large.....40
Apple Firmer Chisel, ass'd.....40
Apple Firmer Chisel, large.....40
Socket Firmer Chisel, ass'd.....40
Socket Framing Chisel, ass'd.....40
B. Smith & Co.'s Pe File.....40
File, assorted.....40
Auger, assorted.....40
Auger, large.....40
Pat. Auger, Ives.....40
Pat. Auger, Douglass.....40
Auger, Swan's.....40
Hoe, Rake, Shovel, &c.....40

Hangers—

Barn Door, old patterns.....70&70&5
Barn Door, New England.....70&70&5
Sarnson Steel Anti-Friction.....55
Orleans Steel.....55
Hamilton Wrought Steel Track.....55
Champion.....60&10
Climax Anti-Friction.....55
Zenith for Wood Track.....55
Sterling.....50&10&60
Victor No. 1, \$15.00; No. 2, \$16.50; No. 3, \$18.00.....50
Kidder's.....50
Boss.....60&10&60
Best Anti-Friction.....60&10&60
Duplex (Wood Track).....60&10&60
Terry's Modern.....50&10&60
Terry's Ideal.....50&10&60
Terry's Solid.....50&10&60
Terry's Shield.....50&10&60
Terry's Wrought Single Strap.....50&10
Cronk's Patent, Steel Covered.....50&10
Carrier Steel Anti-Friction.....50&10
Richards'.....30&80&10
Lane's New Standard.....50&60&25
Lane's Standard.....50&60&25
Lane's Parlor.....20&10&10
Warner's Pat.....20&10&10
Stearns' Anti-Friction.....20&10&10
Stearns' Challenge.....25&10&10
Cincinnati Nos. 1, \$2.25; 2, \$2.50; 3, \$2.50; 4, \$2.50
Paragon Nos. 5, 6, 7 and 8.....20&10
Crescent.....60&80&10
Nickel, Steel, Nos. 0, \$2.50; 1, \$2.00; 2, \$1.50.....40&10&60
Chicago Anti-Friction.....30&10
Star.....40&10&40
Barry.....50&10&60
Interstate.....50&10&60
Pendulum, Payson's.....40&40&10
Moody.....45
Economy, \$6.00.....50&10
Perfection.....50&10&60
Lundy, Steel Parlor.....40
Matchless.....60&10
Magic.....45&10
Wild West.....45
Moore's Elevator.....35
Moore's Baggage Car Door.....35
Moore's Railroad.....65

Harness Snaps—See Snaps.**Hatchets—**

American Axe and Tool Co.....40 & 10
Blood's.....40 & 10
Hunt's.....40 & 10
Hurd's.....40 & 10
Maun's.....40 & 10
Peck's.....40 & 10
Underhill's.....40 & 10
Fayette R. Plumb.....40 & 10
C. Hammond & Son.....40 & 10
Kelly's.....40 & 10
Buffalo Hammer Co.....40 & 10
Sargent's & Co.....40 & 10
P. S. & W. Co.....40 & 10
Schulte, Lohoff & Co.....40 & 10
Ten Eyck Edge Tool Co.....40 & 10
Collins.....40 & 10

Hay and Straw Knives—

See Knives.

Hinges—**Blind Hinges—**

Parker.....75&75&10
Huffer.....50
Clark's Nos. 1, 3, 5, 40 and 60.....80&5&80&10
Clark's Mortise Gravity.....50
Sargent's Nos. 1, 3, 5, 11, 12, 13, 75&75&10
Reading's Gravity.....75&10&75&10&5
Shepard's.....75&10
Noiseless.....75&10
Niagara.....80
Buffalo.....80
Clark's Genuine Pattern.....80
O. S. Lull & Porter.....75&10
Aches, Lull & Porter.....75
Queen City Reversible.....70&10&75
Clark's, Lull & Porter, Nos. 0, 1, 1 1/2, 2, 3, 4.....75&10&25
North's Automatic Blind Fixtures, No. 2, for Wood, \$9.00; No. 3, for Brick, \$11.50.....10

Gate Hinges—

Western.....40
N. E. Reversible.....40
Clark's, Nos. 1, 2, 3.....40
N. Y. State.....40
Reliance.....40
Shepard's.....40

Spring Hinges—

Geer's Spring and Blank Butts.....40
Union Spring Hinge Co.'s list.....20
March, 1886.....20
Barker's Double Acting.....25
Union Mfg. Co.....25
Bommer's Japanned.....35
Bommer's All other Kinds.....30
Buckman's.....15
Chicago.....30
Bardsley's Patent Checking.....15
Acme.....30
U. S.....25
Empire and Crown.....20
Hero and Monarch.....55
American, Gem and Star.....20
Oxford.....20
Royal.....60
Champion.....60
No. 10 Matchless.....60
No. 25 Unbreakable.....60
J. G. C. Covered, gro.....50
Samson.....60
Wiles, No. 1, gro.....10; No. 2.....13
Devore, No. 1.....24
Rex.....13
Freeport.....12
New Idea Nos. 1 and 10.....13
New Idea Dbl. Acting.....45
Ideal No. 3.....10
Stearns' Noiseless Floor Hinge, set.....50

Wrought Iron Hinges—

List February 14, 1891.
Strap and T.....50&10&50&10&10
Corrugated Strap and T.....50&10&50
Screw Hook and (0 to 12 in.).....4
Strap.....14 to 38 in.).....3
Screw Hook and Eye.....4
Rolled Blind Hinges, Nos. 32 and 34.....50&10
Rolled Blind Hinges, Nos. 252 and 254.....55&10
Rolled Plate.....70&10
Rolled Raised.....70&10
Plate Hinges (8, 10 and 12 in.).....5
"Providence" over 12 in.).....4

Hoes—

D. & H. Scovill.....20
Lane's Crescent, Planters' Pattern.....45
Lane's Razor Blade, Scovill Pattern.....30
Maynard, S. & O. Pat.....45
Sandusky Tool Co., S. & O. Pat.....60
Am. Axe and Tool Co., S. & O. Pat.....60
Chattanooga Tool Co., S. & O. Pat.....60
Grub.....60

Eye—

Garden, Mortar, &c.....70&70&5&25
Planter's, Cotton, &c.....70&70&5&25
Warren Hoe.....60&60&5
Magic.....40

Hog Rings and Ringers—

See Rings and Ringers.

Holisting Apparatus—

See Machines, Hoisting.

Hollow-Ware—

See Ware, Hollow.

Holders—

Bag—
Springle's Pat.....40
Bit—
Extension.....40
Barber's.....40
Ives.....40
Diagonal.....40
Angular.....40

File and Tool—

Balz Pat.....40
Nicholson File Holders.....20

Sash—

Motley's Adj. Sash, Medium Size.....40

Hooks—**Cast Iron—**

Bird Cage, Sargent's List.....60&10&10
Bird Cage, Reading.....60&10&10
Clothes Line, Sargent's List.....60&10&10
Clothes Line Moore's.....70

Clothes Line, Reading list.

60&10&60&10&10
Ceiling, Sargent's list.....55&10&10
Harness, Reading list.....55&10&60&10
Coat and Hat, Sargent's list.....55&10&60&10
Coat and Hat, Reading.....50&10&50&10&10
Coat and Hat, Moore's.....70

Wrought Iron—

Cotton.....40
Cotton Pat. (N. Y. Mallet and Handle).....30
Wks.....30
Tassel and Picture, T. & S. Mfg. Co.....50
Wrought Staples Hooks, &c.....50

Wire—

Wire Coat and Hat, Gem, list April, 1886.....60&60&10
Wire Coat and Hat, Miles, list April, 1886.....50&50&10
Indestructible Coat and Hat.....45&45&5
Wire Coat and Hat, Standard.....60&60&10
Handy Hat and Coat.....50&10&60
Steady Ceiling Hooks.....50&10&60
Belt.....80&15&80&20
Atlas, Coat and Hat.....55
Williamson's Bird Cage Hooks, list April, 1892.....40
Bright Wire Goods—See Wire.

Miscellaneous—

Grass, No. 2, \$2.00; No. 3, \$2.10; No. 4, \$2.25
Nolin's Grass.....40
Bush.....55
Whitmetre—Patent.....55
Hooks and Eyes—Malleable Iron.....70
Hooks and Eyes—Brass.....60
Fish Hooks, American.....60
Bench Hooks—See Bench Stops.

Horse Nails—See Nails, Horse**Horse Shoes—**

See Shoes, Horse.

Hose, Rubber—

Competition, Fair quality.....75&75&10
Competition, Low Grade.....50&80&10
Standard.....70&10&70&10&5
Extra.....60&10&60&10&10
N. Y. B. & P. Co., Para.....25&5
N. Y. B. & P. Co., Extra.....40&5&50
N. Y. B. & P. Co., Dundee.....60&60&5
Cotton Garden, 1/4 in. coupled.....7
Fair Quality, 1/2 in. coupled.....8

Huskers—

Blair's Adjustable.....40
Blair's Adjustable Clipper.....40
Hubbard's Solid Steel.....45

Indurated Fiber Ware—

See Ware, Indurated Fiber.

Irons.

Sad—
From 4 to 10, at factory.....100 lb.
Self-Heating.....23
Self-Heating, Tall.....40
Mrs. Potts' Sad Irons, per set.....18
No. 50.....55
No. 60.....65
Small lots.....90
Crown Improved.....60
Ideal Irons, new list.....50&10&50&10&10
Salamander Irons.....25
E. B. Sad Iron.....30
Chinese Laundry (N.E. Butt Co.).....15
New England.....50
Mahony's Troy Pol. Irons.....25
Sensible, list Jan. 91.....50&10&5
Sensible Tailor's Irons.....33
National Self-Heating.....30

Soldering—

Soldering Coppers.....19
Covert's Adjustable, list Jan. 1, 1886.....25
Tinker's Dread.....17
Pinking.....18

Pinking—

Pinking Irons, per doz.....55&60

Jack Screws—See Screws.**Jacks, Wagon—**

Dalay.....33
Victor.....33
Lockport.....40

Kettles—

Brass, Spun, Plain, list Jan. 1, '91.....25
Brass, Spun, Plid. W.M. list Jan. 1, '91.....20
Stamped Brass Kettles.....21
Kneaded and Tea—See Ware, Hollow.

Keys—

Lock, Ass'n list Dec. 30, 1886.....65
Eagle, Cabinet, &c.....33
Hotchkiss' Brass Blanks.....40
Hotchkiss' Copper and Tinned.....40
Hotchkiss' Pad. and Cab.....35
Wollensak Tinned.....60

Knife Sharpeners—

See Sharpeners, Knife.

Knives—

Butcher, Shoe, &c.
Wilson's Butcher Knives, list Dec 8, 1890.....25
Ame's Butcher Knives.....25
Foster Bros' Butcher, &c.....40
Jordan's A. A. Butchers' list.....40
Nichols' Butcher Knives.....40
W. W. Wilson, Butcher, 6 in., \$2.00; 7 in., \$2.70; 8 in., \$3.80, &c.....25
Ame's Shoe Knives.....25
Ame's Bread Knives, per doz.....15
Moran's Shoe and Bread.....20
Hay and Straw—See Hay Knives.
Table and Pocket—See Cutlery.

Corn—

Bradley's.....10
Wadsworth's.....25

Drawing—

Witherby.....75
P. S. & W.....75
Mix.....75
New Haven.....60
Merrill.....60
Douglass.....60
Watrous.....15

L. & I. J. White.....20
Bradley's.....35
Adjustable Handle.....25
Wilkinson's Folding.....25

Hay and Straw—

Lightning, from jobbers.....75
Wadsworth's.....40
Carter's Needle.....40
Heath's.....40
Nolin's Hay.....40

Mincing

Am. (2d quality), 1/2 gr., 1 blade, \$7
2 blades, \$12; 3 blades, \$18.....net
Lithop's.....20
Smith's, per doz, Single, \$2; Double \$3.....50
Knapp & Cowles.....50
Buffalo Adjustable.....33

Knobs—

Door, Mineral.....60
Door, Por. Jap'd.....70
Door, Por. Nickel.....25
Door, Por. Plated Nickel.....25
Drawer, Porcelain.....60
Hemacite Door Knobs.....40
Yale & Towne Wood, list Dec., 1885.....40
Base, Rubber Tip.....70
Picture, Judd's.....60
Picture, Sargent's.....70
Picture, Hemacite.....35
Shutter, Porcelain.....65
Carriage, Jap.....80
Bardsley's Wood Door, Shutter, &c.....15

Ladders.

Davies Extension and Single.....20

Ladles—

Melting, Sargent's.....60
Melting, Reading.....35
Melting, P. S. & W.....35
Melting, Warner's.....30

Lanterns—**Tubular—**

Regular, with Guard.....40
O. K. with Guard.....40
Side Lift, with Guard.....40
Square Lift, with Guard.....40
Anti-Friction, with Guard.....40
Brass Plated, Sq. Lift, Guard.....40
Cop. Plated, Sq. Lift, Guard.....40

Bull's Eye Police—

2 1/2-inch regular.....40
3-inch regular.....40
2 1/2-inch flash light.....40
3-inch flash light.....40

Lawn Mowers—

See Mowers, Lawn.

Leaders, Cattle—

Hudson, Beckley & Co.'s.....70
Sargent's.....70
Hotchkiss.....30
Peck, Stow & W. Co.....60

Lemon Squeezers—

See Squeezers, Lemon.

Lifters, Transom—

Wallenak's:
Class 3 and 4, Bronze Iron.....60
Class 3 and 4, Bronze Metal.....50
Class 3 and 4, Brass.....60
Skylight Lifters.....35
Rehner's, list Feb. 20, 1891.....60
Bronzed Iron Rods.....30
Brass, Real Bronze or Nickel Plate.....30
Excelsior.....50
Shaw's.....50
Payson's:
Universal.....60
Solid Grip.....60
Imperial.....50

Lines—

Cotton and Linen Fish.....50
Chalk.....60
Mason's Linen, 3/4 ft. No. 1, \$1.25; No. 2, \$1.75; No. 3, \$2.25; No. 4, \$2.75; No. 5, \$3.25.....25
Cotton Chalk.....55
Samson Cotton, No. 4, \$2; No. 4 1/2, \$2.50.....10
Silver Lake, Braided No. 0, \$6.00; No. 1, \$6.50; No. 2, \$7.00; No. 3, \$7.50.....25
gro.....25
Mason's Linen, No. 3 1/2, \$1.50; No. 4, \$2.00; No. 4 1/2, \$2.50.....45
Mason's Colored Cotton.....15
Vix Clothes, Nos. 18 1/2, 19 1/2, 20 1/2, 21 1/2, 22 1/2, 23 1/2, 24 1/2, 25 1/2, 26 1/2, 27 1/2, 28 1/2, 29 1/2, 30 1/2, 31 1/2, 32 1/2, 33 1/2, 34 1/2, 35 1/2, 36 1/2, 37 1/2, 38 1/2, 39 1/2, 40 1/2, 41 1/2, 42 1/2, 43 1/2, 44 1/2, 45 1/2, 46 1/2, 47 1/2, 48 1/2, 49 1/2, 50 1/2, 51 1/2, 52 1/2, 53 1/2, 54 1/2, 55 1/2, 56 1/2, 57 1/2, 58 1/2, 59 1/2, 60 1/2, 61 1/2, 62 1/2, 63 1/2, 64 1/2, 65 1/2, 66 1/2, 67 1/2, 68 1/2, 69 1/2, 70 1/2, 71 1/2, 72 1/2, 73 1/2, 74 1/2, 75 1/2, 76 1/2, 77 1/2, 78 1/2, 79 1/2, 80 1/2, 81 1/2, 82 1/2, 83 1/2, 84 1/2, 85 1/2, 86 1/2, 87 1/2, 88 1/2, 89 1/2, 90 1/2, 91 1/2, 92 1/2, 93 1/2, 94 1/2, 95 1/2, 96 1/2, 97 1/2, 98 1/2, 99 1/2, 100 1/2.....30
Ventilator Cord, Samson Braided, White or Drab Cotton, per doz.....20
Ossawan Mills, Chalk, Twisted, 60%; Chalk, Soft Braided, 50% Chalk, Braided, 25%.

Links, Open—

Terry's—per gro.:
Nos.....1 2 3 4
\$6.00 8.00 12.00 16.00

Locks, &c.—**Cabinet—**

Eagle, Gaylord Par. list March '84, rev. ker and Corbin.....40
Delta, Nos. 36 to 39.....40
Delta, Nos. 51 to 63.....40
Delta, Nos. 87 to 99.....40
Champion Night Latches.....40
Barnes Mfg. Co.....40
Eagle and Corbin Trunk.....25
Champion Cab. and Combin.....33
Yale.....net prices
Romer's.....25

Door, Locks, Latches, &c

R. & E. Mfg. Co., list Mar. 20, 1889.....60
Mallory, Wheeler & Co., list July, '88.....lower net prices
Sargent & Co., list Aug. 1, '88.....often made

Pullers Nail—

Scranton.....\$ doz., \$18.00, 33¢
 Giant, No. 1.....\$ doz., \$18.00, 10¢
 Giant, No. 2.....\$ doz., \$15.00, 10¢
 Pelican.....\$ doz., \$9.00, 25¢
 Eclipse.....\$ doz., \$24.00, 40¢
 Economy.....\$ doz., \$6.00

Pulleys—

Hot House Awning, &c.....60¢@70¢
 Japanned Sorew.....60¢@10¢
 Brass Screw.....70¢
 Japanned Side.....60¢@10¢
 Moore's Side, Anti Friction.....60¢
 Moore's Ceiling or End, Anti-Friction.....40¢
 Moore's Dumb Waiter, Anti-Friction.....60¢
 Moore's Electric Light.....35¢
 Japanned Cloth Line.....60¢@10¢
 Hay Fork, Solid Eye, \$4.00; Swivel, \$4.50.....50¢@10¢
 Hay Fork, "Anti-Friction," 5 in. solid, \$6.70.....50¢
 Hay Fork, "F" Common and Patent Bushed.....20¢
 Hay Fork, "F" Common and Patent.....20¢
 Hay Fork, Head's Self-Lubricating.....60¢
 Hay Fork, Moore's Anti-Friction 5 in. Wheel, \$ doz., \$12.00.....40¢
 Shade Rack.....45¢
 Tackle Blocks—See Blocks.
 Shepard's Niagara, No. 25, \$ doz 23¢ net
 Sash (Auger Mortise).....60¢
 Common Sense.....60¢
 Empire.....60¢
 Ideal, Nos. 2, 4, 10 & 15, \$ doz less 1¢
 Acme.....\$ doz net.
 Star.....\$ doz net.
 On bbl. lots extra 5¢.
 Ideal, Nos. 25 and 65, \$ doz. 22¢ net.

Pumps—

Cistern, Best Makers.....60¢@10¢
 Pitcher Spout, Best Makers.....87¢@10¢
 Pitcher Spout, Cheaper G'ds.....75¢@10¢

Punches—

Saddler's or Drive, good.....\$ doz., 60¢@85¢
 Bemis & Call Co.'s Cast Steel Drive.....50¢@85¢
 Bemis & Call Co.'s Springfield Socket.....50¢
 Spring, good quality.....\$ doz., \$2.50@3.00
 Spring, Leach's Pat.....\$ doz., \$2.50@3.00
 Bemis & Call Co.'s Spring.....50¢@85¢
 Bemis & Call Co.'s Check.....55¢
 Solid Timmers, P. S. & W. Co., \$ doz. \$1.44.....55¢
 Timmers' Hollow Punches, P. S. & W. Co.....20¢@25¢
 Rice Hand Punches.....15¢
 Avery's Revolving.....40¢
 Avery's Sawset and Punch—See Sawsets
 Niagara Hollow Punches.....20¢@25¢
 Niagara Solid Punches.....55¢

Rail—

Sliding Door, Wrt Brass.....\$ b. 35¢, 40¢
 Sliding Door, Bronzed Wrt Iron.....\$ ft. 7¢
 Sliding Door, Iron, Painted.....\$ ft. 4¢, 10¢
 Barn Door, Light, In.....\$ 3¢, 5¢
 Per 100 feet.....\$2.00 2.50 3.10, 40¢
 B. D. for N. E. Hangers—

Small. Med. Large.
 Per 100 feet.....\$3.15 2.70 3.25 Net
 Victor's Steel Rail.....\$ ft. 4¢, 5¢
 Victor Track Rail, 7¢ per foot.....50¢@85¢
 Carrier, double braced, Steel Rail, 7¢ per foot.....31¢@4¢
 Lundy Parlor Door, Planed Edge, 7¢ per ft.....7¢
 Moore's Steel Rail.....25¢@10¢
 Moody steel Rail \$ ft. 5¢.....45¢

Rakes—

Cast Steel, Association g'ds.....70¢@70¢@5¢@2¢
 Cast Steel, outside g'ds.....70¢@70¢@5¢@2¢
 Malleable.....70¢@70¢@5¢@2¢
 Gibbs' Lawn Rake.....\$ doz., \$4.90
 Gibbs' Canton Lawn Rake.....\$ doz., \$3.75
 Gibbs' Acme Lawn Rake.....\$ doz., \$4.75
 Gibbs' Favorite Lawn Rake.....\$ doz., \$3.90
 Gibbs' Crown Lawn Rake, No. 1, \$2.95, 40¢
 Onelda Lawn Rake.....\$ doz., \$6.00
 Fort Madison Prize Bow Brace and Peerless.....65¢
 Fort Madison Steel Tooth Lawn Rake.....25¢

Razors—

J. R. Torrey Razor Co.....20¢
 Wostenholm and Butcher, \$10 to £.....20¢
 Jordan's A.A.A. new list.....Net
 Jordan's Old Faithful, new list.....Net
 Galvanic.....\$ doz., \$15.00
 Electric Cutlery Co.....Net
 Campbell Cutlery Co.....60¢

Razor Straps—

See Straps, Razor.

Registers—

Moore's Japanned.....75¢
 Moore's Electroplated.....75¢
 Moore's Bronze Finishes.....70¢
 Moore's Solid Bronze.....65¢
 Moore's Stove Pipe.....35¢

Rings and Ringers—

Bull Rings—
 Union Nut Co.....55¢
 Sargent's.....75¢@10¢
 Hotchkiss' low list.....30¢
 Humason, Beckley & Co.'s.....70¢@10¢
 Peck, Stow & W. Co.'s.....50¢@10¢
 Ellrich Hd. Co., White Metal, low list.....50¢@10¢

Hog—

Top of the Hill Ringers.....\$ doz \$2.00
 Top of the Hill Ringers.....\$ doz \$1.25
 Hill's Improved Ringers.....\$ doz \$1.25
 Hill's Old Style Ringers.....\$ doz \$1.12¢
 Hill's Tongue.....\$ doz \$3.00
 Hill's Rings.....\$ doz bxs \$1.00
 Perfect Ringers.....\$ doz bxs \$1.50
 Blair's Hog Ringers.....\$ doz \$2.25
 Blair's Hog Ringers.....\$ doz \$2.00
 Champion Ringers.....\$ doz \$2.00
 Champion Ringers, Double.....\$ doz \$2.25
 Brown's Ringers.....\$ doz \$2.00
 Brown's Ringers.....\$ doz \$1.15@1.25
 Electric Hog Ringers.....\$ doz boxes \$1.50
 Electric Hog Ringers.....\$ doz \$2.00
 Major Ringers.....\$ doz \$2.00
 Major Ringers.....\$ doz \$2.00

Rivets and Burrs—

Norway Iron, list Nov. 17, '87.....60¢@10¢
 Second quality.....70¢
 Copper.....60¢@10¢
 Copper Iron, Betina Brand.....50¢@85¢

Rivet Sets—See Sets.**Roasting and Baking Pans—See Pans, Roasting and Baking.****Rods—**

Stair, Brass.....25¢@30¢
 Stair, Black Walnut.....\$ doz 40¢

Rollers—

Barn Door, Sargent's list.....60¢@10¢
 Arme Moore's Anti-Friction.....55¢
 Union Barn Door Roller.....70¢
 Moore's Barn Door Stay.....60¢
 Thompson Mfg. Co.'s Lawn Rollers.....30¢

Rope—The following prices are f.o.b., New York or factory, and are shaded 1/4¢@1/2¢ on large lots; terms, 1 1/2% for cash.

Manila, 7-16 in. diam. and larger.....\$ b 8 1/2¢
 Manila, 7-16 in. diam. and 5-16 in.....\$ b 9 1/2¢
 Manila, Tarred Rope.....\$ b 8 1/2¢
 Manila, Hay Rope, Medium.....\$ b 8 1/2¢
 Sisal.....7-16 inch and larger.....\$ b 7 1/2¢
 Sisal.....1/4 and 5-16 in.....\$ b 7 1/2¢
 Sisal, Hay Rope.....\$ b 6 1/2¢
 Sisal, Tarred Rope.....\$ b 6 1/2¢
 Sisal, Medium Lath Yarn.....\$ b 6 1/2¢
 New Zealand, 7-16 in. & larger.....\$ b 6 1/2¢
 New Zealand.....1/4 inch, \$ b 6 1/2¢
 New Zealand.....5-16 inch, \$ b 7 1/2¢
 New Zealand, Hay Rope.....\$ b 6 1/2¢
 New Zealand, Tarred Rope.....\$ b 6 1/2¢
 Cotton Rope.....\$ b 6 1/2¢
 Jute Rope.....\$ b 6 1/2¢@7¢

Wire—

List February, 1892. All kinds.....45¢

Rules—

Boxwood.....80¢@10¢@80¢@10¢@10¢
 Ivory.....50¢@10¢
 Starrett's Steel Rules and Straight Edges.....25¢@10¢

Sad Irons—See Irons, Sad.**Sand and Emery Paper and Cloth—**

See Paper and Cloth.

Sash Cord—See Cord, Sash.**Sash Locks—See Locks, Sash.****Sash Weights—**

See Weights, Sash.

Sausage Stuffers or Fillers—See Stuffers or Fillers, Sausage.**Saws—**

Note.—Extra 5¢@10¢ often given.

Diston's Circular.....45¢@45¢
 Diston's Cross Cut, list Jan. 1, '93, 40¢@10¢
 Diston's Hand.....25¢
 Woodrough & McParlin.....25¢@10¢
 Hand, Padden and Rip.....25¢@10¢
 Cross Cuts, list Jan. 1, 1893.....45¢@10¢
 Hand, Padden and Rip.....30¢@10¢
 Cross Cuts, list Jan. 1, 1893.....45¢@10¢
 Atkins' Circular.....50¢@10¢
 Atkins' Cross Cuts, new list.....40¢
 Atkins' Mulay, Mill and Drag.....50¢@10¢
 Atkins' One-Man Saw.....40¢
 Atkins' Wood Saws.....40¢
 Peace Circular and Mill.....45¢@45¢
 Peace Hand Panel and Rip.....25¢@25¢
 Peace Cross Cuts, list Jan. 1, '93.....45¢@10¢
 Richardson's Circular and Mill.....45¢@45¢
 Richardson's X Cuts, list Jan. 1, '93.....45¢@10¢
 Richardson's Hand, &c.....25¢@25¢
 C. E. Jennings & Co.'s.....25¢

Hack Saws—

Griffin's, complete.....40¢@10¢
 Griffin's Hack Saw Blades.....40¢@10¢
 Star Hack Saws and Blades.....25¢
 Eureka and Crescent.....25¢

Scroll—

Lester, complete, \$10.00.....25¢
 Rogers, complete, \$4.00.....25¢
 Barnes' Builders' and Cab Makers' \$15.25¢
 Barnes' Scroll Saw Blades.....35¢

Saw Frames—

See Frames, Saw.

Saw Sets—See Sets, Saw.**Saw Tools—See Tools, Saw.****Scales—**

Hatch, Counter, No. 171, good quality.....\$ doz \$18.00@19.00
 Hatch, Tea, No. 161.....\$ doz \$6.50@7.00
 Union Platform, Plain.....\$2.10@2.20
 Union Platform, Striped.....\$2.40@2.50
 Chatillon's Grocers' Trip Scales.....50¢
 Chatillon's Eureka.....25¢
 Chatillon's Favorite.....40¢
 Family Turnbells.....30¢@10¢
 Reliable Bros.' Platform.....40¢

Scale Beams—

See Beams, Scale.

Scissors, Fluting.....45¢**Scrapers—**

Adjustable Box Scraper (S. R. & L. Co.).....\$3.00@10¢
 Box, 1 Handle.....\$ doz \$2.00
 Box, 2 Handle.....\$ doz \$2.00
 Defiance Box and Ship.....20¢@10¢
 Foot.....50¢@10¢
 Ship, Common.....\$ doz \$3.50
 Ship, R. I. Tool Co.....10¢

Screen Window and Door**Frames—See Frames****Screw Drivers—**

See Drivers, Screw.

Screws—**Bench and Hand—**

Bench, Iron.....55¢@10¢@55¢@10¢
 Bench, Wood, Beech.....\$ doz \$2.25
 Bench, Wood, Hickory.....20¢@10¢
 Hand, Wood.....25¢@10¢
 Hand, Grand Rapids, list.....35¢

Coach, Lag and Hand-Rail—

Lag, Blunt Point, list Jan. 1, 1890.....80¢@10¢
 Coach and Lag, Gimlet Point, list Jan. 1, 1890.....80¢@10¢
 Hand Rail, Sargent's.....70¢@10¢
 Hand Rail, H. & B. Mfg.....70¢@10¢
 Hand Rail, Am. Screw.....70¢

Jack Screws—

Jack Screws, Millers Falls list.....50¢@50¢
 Jack Screws, P. S. & W.....35¢
 Jack Screws, Sargent.....70¢
 Jack Screws, Stearns.....40¢@10¢

Cork—

Humason & Beckley Mfg. Co.....40¢@10¢
 Williamson's.....35¢@35¢
 Williamson's Forged Worm, Applewood Handle, \$ doz., \$5.00; Rosewood, \$5.50.....40¢
 Detroit Cork Screw Co.....35¢

Machine—

Flat Head Iron.....65¢
 Round Head Iron.....60¢

Wood—

List January 1, 1891.
 Flat Head Iron.....70¢
 Round Head Iron.....65¢
 Flat Head Brass.....70¢
 Round Head Brass.....65¢
 Flat Head Bronze.....70¢
 Round Head.....65¢
 Rogers' Drive Screws.....82¢

Scroll Saws—See Saws, Scroll.**Scythes—**

Grain.....40¢@50¢
 Grass.....40¢@10¢

Scythe Snaths—

See Snaths, Scythe.

Sets—**Awl and Tool—**

Alken's Sets, Awls and Tools.....60¢@80¢
 Fray's A.C. Tool Eds., Nos. 1, \$12; 2, \$18; 3, \$12; 4, \$9.....45¢
 Millers Falls A.C. Tool Eds.....25¢
 Henry's Combination Haft.....\$ doz \$8.50
 Stanley's Excelsior:
 No. 1, \$7.50; No. 2, \$4.00; No. 3, \$6.00.....30¢@10¢
 Common Brad Sets.....30¢@10¢
 No. 42, \$10.50; No. 43, \$12.50.....70¢@10¢

Nail—

Square.....\$ gr. \$4.00@4.25
 Round.....\$ gr. \$3.25
 Buck Bros.....27¢
 Cannon's Diamond Point.....\$ gr. \$12, 20¢

Rivet—

Regular list.....70¢

Saw—

Stillman's Genuine.....\$ doz \$5.00@7.75
 Stillman's Pattern, Hand, \$ doz \$3.25; Cross Cut, \$8.50.....55¢@55¢
 Common Lever.....\$ doz \$2.00, 45¢@50¢
 Morrill's No. 1, \$15.00.....40¢@20¢
 No. 11, \$16.00.....40¢@20¢
 No. 12, \$16.00.....40¢@20¢
 No. 5, Mill, \$31.00.....40¢@20¢
 No. 10, \$15.50.....40¢@20¢
 Leach's No. 0, \$8.00; No. 1, \$15.....15¢@20¢
 Nash's.....20¢@10¢
 Hammer, Hotchkiss.....\$5.50, 10¢
 Hammer, Bemis & Call Co.'s new Pat.....45¢
 Kohler's Call Spring Hammer.....50¢
 Bemis & Call Co.'s Plate.....20¢
 Bemis & Call Co.'s Cross Cut.....30¢@5¢
 Aiken's Genuine.....\$13.00, 60¢@60¢
 Aiken's Imitation.....\$ doz \$3.00@3.25
 Hart's Pat. Lever.....20¢
 Diston's Star.....25¢
 Leopold.....40¢@10¢
 Atkin's Lever.....\$ doz No. 1, \$3.00
 Atkin's Criterion.....\$ doz No. 1, \$6.00
 Croissant (Keller), No. 1, \$15.00; No. 2, \$24.00.....40¢@10¢
 Avery's Saw Set and Punch.....60¢
 Kohler's Royal.....\$ doz \$7.00
 Kohler's Call Spring Hammer.....\$ doz \$12.00
 Crescent.....\$ doz \$3.00
 Lloyd's Acme.....\$ doz \$15, 40¢@10¢
 Taintor Positive.....\$ doz \$18, 50¢

Sharpeners, Knife—

Larkins.....\$ doz \$6.00, 40¢
 Applewood Handles.....\$ doz \$6.00, 40¢
 Rosewood or Cocobola.....\$ doz \$9.00, 40¢

Shaves, Spoke—

Iron.....45¢
 Wood.....30¢
 Bailey's (Stanley R. & L. Co.).....40¢@10¢
 Stearns.....30¢@10¢
 Cincinnati.....25¢@10¢
 Goodell's.....\$ doz \$9.00.....25¢

Shears—

American (Cast) Iron.....75¢@10¢
 Barnard's Lamp Trimmers.....\$ doz \$3.75
 Seymour's, List Dec. 1891.....60¢@10¢
 Heinich's, List Dec. 1891.....60¢@10¢
 Heinich's Tailor's Shears.....35¢
 Cast Steel Trimmers:
 First quality.....80¢@80¢
 Second quality.....80¢@10¢
 Aime Cast Shears.....10¢
 Diamond Cast Shears.....10¢
 Clipper.....10¢@10¢
 Victor Cast Shears.....75¢@10¢
 Howe Bros. & Hulbert, Solid Forged Steel.....40¢
 Dares Cutlery Co., Solid Steel Forged.....60¢
 Dares Cutlery Co.....60¢@10¢
 Claus brand, Japanned.....70¢
 Claus brand, Nickel, same list.....60¢
 Galvanic 3/4 to 9 in., \$ doz. \$1.00 1 inch Electric Cutlery Co.....Net
 Campbell Cutlery Co., Jap'd.....75¢
 Nickel Plated.....65¢

Timmers' Snips—

Wrt. Handles, Steel Blades.....20¢@10¢
 Niagara Snips and Shears.....20¢@10¢
 Cast Handles, Laid with Steel.....40¢

Pruning Shears and Hoo—

Disston's Combined Pruning Hook and Saw.....\$ doz \$18.00, 20¢@10¢
 Disston's Pruning Hook.....\$ doz \$12.00, 20¢@10¢
 E.S. Lee & Co.'s Pruning Tools.....50¢@10¢
 Pruning Shears, Henry's Pat.....\$ doz \$3.50@4.00
 Henry's Pruning Shears.....\$ doz \$4.25
 Wheeler, M. & C. Co., Combination.....\$4.50
 Dunlap's Saw and Chisel.....\$ doz \$3, 50¢, 30¢
 J. Mallinson & Co., No. 1, \$5.25; No. 2, \$7.25
 P. S. & W. Co.....60¢
 Levin Pruner No. 1, \$15.00 \$ doz 40¢@3¢
 Levin Pruner No. 2, \$21.00 \$ doz 40¢@3¢

Timmers' &c.—

Shears and Snips (P. S. & W.).....20¢@25¢
 Snips, J. Mallinson & Co.....33¢

Sheaves—

Sliding Door—
 M. W. Co., list July, 1888.....50¢@10¢
 R. & E., list Dec. 13, 1885.....55¢@10¢
 Corbin's list.....60¢@10¢
 Patent Roller.....60¢@10¢
 Patent Roller, Hatfield's.....75¢
 Russell's Anti-Friction, list Dec. 1885.....60¢@2¢
 Moore's Anti-Friction.....50¢

Sliding Shutter—

R. & E., list Dec. 13, 1885.....60¢@10¢
 Sargent's list.....70¢
 Reading list.....60¢@10¢

Shells—

First quality 4, 8, 10 and 12 gauge.....25¢@10¢
 First quality Rival, Club and Climax brands, 14, 16 and 20 gauge (\$7.50 list).....20¢@10¢
 First quality 4, 8, 10 and 12 gauge.....25¢@10¢
 Star, Club, Rival and Climax Brands.....35¢@10¢
 Smokeless brand, 12, 10, 16 gauge.....35¢@10¢
 Trap brand, 12 and 10 gauge.....35¢@10¢
 Selbold's Comb. Shot Shells.....15¢@2¢
 Brass Shot Shells, list quality.....60¢@2¢
 Brass Shot Shells, Club, Rival, Climax.....65¢@2¢

Shells, Loaded—

Standard list, July 19, 1890.....40¢@10¢
 40¢@10¢@40¢@10¢@10¢
 7¢ cash, 10 days.

Ship Tools—

L. & I. J. White.....20¢@5¢

Shoes, Horse, Mule, &c—**Horse—**

Burden's, Perkins', Phoenix, Standard, Diamond State, Bryden's Boss and Crescent, at factory.....\$4.00
 Bryden's Frog Pressure, at factory.....\$5.00

Mule—

Add \$1 per keg to above prices.

Ox Wrought—

Ton lots.....\$ b 9¢
 1000 lb lots.....\$ b 9¢
 500 lb lots.....\$ b 10¢

Shot—

Drop, up to B, 25-b bag.....\$1.45
 Drop, up to B, 5-b bag......35¢
 Drop, B and larger, 25-b bag.....1.70
 Drop, B and larger, 5-b bag......40¢
 Buck and Chilled, 25-b bag.....1.70
 Buck and Chilled, 5-b bag......40¢
 Dust Shot, 25-b bag.....2.00
 Dust Shot, 5-b bag......45¢

Shovels and Spades—

Ames' Shovels, Spades, &c., list Nov. 1, 1885.....20¢
 Note.—Jobbers frequently give 5¢@7¢ extra on above.
 Griffith's Black Iron.....50¢@10¢
 Griffith's C. S.....60¢@10¢
 Griffith's Solid C. S. R. R. Goods.....20¢
 Tinsley, Blans & Co.....15¢@25¢
 Hubbard & Co.....20¢@20¢
 Lehigh Mfg. Co.....50¢@10¢
 H. M. Myers Co.....30¢
 Payne Pettibone & Son.....35¢
 Remington's (Lowman's Pat.).....40¢@10¢
 Rowland's Black Iron.....50¢@10¢
 Rowland's Steel.....60¢@10¢
 Terra Haute Shovel &.....25¢

Shovels and Tongs—

Iron Head.....60¢@10¢
 Brass Head.....60¢@10¢

Sieves and Sifters—

Mann's Tin Rim.....50¢@25¢
 Buffalo Metallic, S. S. & Co.....50¢@25¢
 Shaker (Barber's Pat.) Flour Sifters.....\$ gr \$21 00
 Electric Light.....\$ doz \$1.50; \$ gr \$15 00
 A. & W. Sifters.....\$ gr \$15 00
 Hunter's Genuine.....\$ doz \$1.75; \$ gr \$15 00
 Hunter's Imitation.....\$ doz \$1.75; \$ gr \$15 00

Sieves, Wooden Rim—

Mesh 18, Nested.....\$ doz \$0.80
 Mesh 20, Nested.....\$ doz \$1.10
 Mesh 24, Nested.....\$ doz \$1.15

Snaps, Harness, &c.

Anchor (T. & S. Mfg. Co.)	60¢
Fitch (Frisco)	50¢ to 10¢
Hutchins	50¢
Andrews	50¢
Sargent's Patent Guarded	70¢ to 10¢
German, new list	40¢ to 10¢
Covert	50¢ to 10¢
Covert, New Patent	50¢ to 10¢
Covert, New E. E.	60¢ to 10¢
Covered Spring	60¢ to 10¢
Covert's Saddlery Works' Triumph	33¢
John "rotz Snaps"	70¢ to 10¢
Kelley & Woolworth's Steel Harness	50¢ to 10¢

Snaths

Scythe	50¢ to 25¢ to 5¢ to 2¢
--------	------------------------

Soldering IronsSee *Irons, Soldering*.**Splittoons, Cuspidors, &c.****Standard Fiberware**

Cuspidors, 8 1/2 inch, 1/2 doz, No. 5, \$3; No. 5, \$3.

Splittoons, Daisy, 8-inch, No. 1, 1; 10 and 11 inch, \$4.

Spoke ShavesSee *Shaves, Spoke*.**Spoke Trimmers**See *Trimmers, Spoke*.**Spoons and Forks****Tinned Iron**

Basting, Cen. Stamp, Co.'s list, 70¢ to 10¢

Solid table and Tea, Cen. Stamp, Co.'s list, 70¢ to 10¢

Buffalo, S. S. & Co., 33¢ to 2¢

Silver Plated

4 months or 5¢ cash 30 days:

Meriden Brit. Co., Rogers, 40¢ to 15¢

Rogers & Hamilton, 40¢ to 15¢

C. Rogers & Bros, 40¢ to 15¢

Rogers & Bros, 40¢ to 15¢

Reed & Barton, 40¢ to 15¢

Wm. Rogers Mfg. Co., 40¢ to 15¢

Simpson, Hall, Miller & Co., 40¢ to 15¢

Holmes & Edwards Silver Co., 40¢ to 15¢

L. Boardman & Son, 50¢ to 12¢

Miscellaneous

Holmes & Edwards Silver Co., 50¢ to 10¢

No. 67 Mexican Silver, 50¢ to 10¢

No. 30 Silver Metal, 50¢ to 10¢

No. 24 German Silver, 50¢ to 10¢

No. 60 Nickel Silver, 50¢ to 10¢

No. 40 Nickel Silver, 50¢ to 10¢

Wm. Rogers Mfg. Co., 50¢ to 10¢

Rogers' Silver Metal, 50¢ to 10¢

18¢ Rogers' German Silver, 50¢ to 10¢

22¢ Rogers' Nickel Silver, 50¢ to 10¢

Rogers & Hamilton:

Steel Goods, 40¢ to 10¢

Cimtar, Flatware, 40¢ to 15¢

Cimtar, Steel Goods, 40¢ to 10¢

Crown Hamilton, Flatware and Cutlery, 30¢

German Silver, 50¢ to 10¢

Nickel Silver, 50¢ to 10¢

Britannia, 60¢ to 7¢

Boardman's Nickel Silver, list July 1, 1891, 60¢ to 7¢

Boardman's Britannia Spoons, case, 60¢ to 5¢

Springs

Torrey's Rod, 39 in., 1/2 doz \$1.20; 1/2 doz \$1.20

Warner's No. 1, 1/2 doz \$1.50; No. 2, 3/4 doz, 55¢ to 5¢ to 10¢

Gem (Coll), list April 19, 1886, 20¢

Star (Coll), list April 19, 1886, 20¢ to 10¢

Victor (Coll), 60¢ to 10¢

Champion (Coll), 60¢ to 10¢

Cowell's No. 1, 1/2 doz \$1.00; No. 2, 1/2 doz, 50¢ to 10¢

Rubber, complete, 1/2 doz \$4.50, 55¢ to 10¢

Hercules, 50¢ to 10¢

Carriage, Wagon, &c.

Elliptic Concord, Platform and Half Scroll, 60¢ to 10¢

Cliff's Bolster Springs, 25¢

Squares

Steel and Iron, 80¢ to 10¢ to 80¢ to 25¢

Nickel Plated, 60¢ to 10¢

Dixon's Try Square and T Bevels, 50¢

Winterbottom's Try and Miter, 30¢ to 10¢

Starrett's Micrometer Calliper Squares, 25¢

Avery's Flush Bevel Squares, 40¢

Avery's Bevel Protractor, 50¢

Squeezers**Fodder**

Blair's, 1/2 doz \$2.00

Blair's "Olimax", 1/2 doz \$1.25

Lemon

Porcelain Lined, No. 1, 1/2 doz \$3.00

Wood, No. 2, 1/2 doz \$3.00, 35¢

Wood, Common, 1/2 doz \$1.70 to 1.75

Dunlap's Improved, 1/2 doz \$3.75, 20¢

Sammis No. 1, \$5.00; No. 2, \$3; 12¢

Jennings' Star, 1/2 doz \$2.50

The Boss, 1/2 doz \$2.50

Dean's, No. 1, 1/2 doz \$3.50; 2, \$3.35; 3, \$1.90; Queen, \$2.50

Little Giant, 50¢ to 10¢

King, 40¢ to 5¢

Hotchkiss Straight Flash, 1/2 doz \$12.00

Silver & Co., Glass, 1/2 doz \$9.00

Standard Fiber WareSee *Ware, Standard Fiber*.**Staples**

Barbed Blind, 1/4 in. and larger, 1/2 doz \$7.75

Barbed Blind, 1/4 in., Same price

Fence Staples, Galvanized, as Brb Wire

Fence Staples, Plain, See Trd. Rep

Grand Crossing Tack Co.'s list, 75¢ to 10¢

Steelyards

40¢ to 10¢ to 50¢

Sticks and Dies

Blacksmith's:

Waterford's Goods, 35¢

Butterfield's Goods, 35¢

Lightning Screw Plate, 25¢ to 30¢

Reece's New Screw Plates, 25¢ to 30¢

Reversible Ratchet, 30¢

Gardner, 25¢

Green River, 25¢ to 30¢

Stops, Bench

Morrill's, 1/2 doz, No. 1, \$10.00; No. 2, \$11.00

40¢ to 20¢

Hotchkiss, 1/2 doz, \$5, 10¢ to 10¢

Weston's, No. 1, \$10, No. 2, \$8, 25¢ to 10¢

McGill's, 1/2 doz \$3, 10¢

Cincinnati, 25¢ to 10¢

Terrell's Nos. 1 and 2, 1/2 doz, \$3; No. 3, \$3.50, 30¢

Millers Falls, 25¢

Stearns', 20¢ to 10¢

StoneSee *Grindstones*.**Scythe Stones**

Pike Mfg. Co., list April, 1892, 33¢

Cleveland Stone Co., list Nov. 1892, 33¢

Oil Stones, &c.

Pike Mfg. Co.:

Hindustan No. 1, 1/2 doz, 8¢

Sand Stone, 1/2 doz, 40¢ to 40¢

Turkey Oil Stone, 4 to 8 in., 10¢

Turkey Slips, 1/2 doz, \$2.00

Lily White Washita, 60¢

Rosy Red Washita, 60¢

Washita Stone, Extra, 50¢

Washita Stone, No. 1, 40¢

Washita Stone, No. 2, 30¢

Lily White Slips, 80¢

Rosy Red Slips, 80¢

Standard Slips, Extra, 80¢

Washita Slips, No. 1, 70¢

Arkansas Stone, No. 1, 3 to 5 1/2 in., \$2.30

Arkansas Stone, No. 1 1/2 to 8 in., \$3.50

Lake Superior, 1/2 doz, 19¢

Lake Superior Slips, 1/2 doz, 20¢

Stove PolishSee *Polish, Stove*.**Stretchers Carpet**

Cast Steel, Polished, 1/2 doz \$2.2

Cast Iron, Steel Points, 1/2 doz \$5 to \$8

Sockets, 1/2 doz \$1.75

Bullard's, 25¢ to 10¢

Strops, Razor

Genuine Emerson, 60¢ to 80¢

Imitation, 1/2 doz \$2.00, 20¢ to 10¢

Torrey's, 20¢

Badger's Belt and Com., 1/2 doz \$2.00

Lamont Combination, 1/2 doz \$4.00

Jordan's Pat. Padded, list Nov. 1, 189, 50¢

Electric Cutlery Co., Net

Campbell Cutlery Co., Net

Stuffer, Sausage

Miles' Challenge, 1/2 doz \$2.00, 50¢ to 50¢

Perry, 1/2 doz, No. 1, \$15.00; No. 0, 50¢ to 50¢

Draw Cut No. 4, each \$3.00, 20¢

Enterprise Mfg. Co., list Jan 17, '98, 25¢

Silver's, 40¢ to 10¢

Sweepers, Carpet and Lawn

Bissell No. 5, 1/2 doz \$17.00

Bissell No. 8, 1/2 doz \$20.00

Bissell, Grand, 1/2 doz \$36.00

Standard, 1/2 doz \$24.00

Domestic, 1/2 doz \$21.00

Domestic, No. 2, 1/2 doz \$22.00

Grand Rapids, 1/2 doz \$24.00

Crown Jewel, No. 1, \$18.00; No. 2, \$19.00; No. 3, \$20.00

Magie, 1/2 doz \$15.00

Improved Parlor Queen, 1/2 doz \$27.00

Nickel, 1/2 doz \$24.00

Japanned, 1/2 doz \$22.00

Excelsior, 1/2 doz \$18.00

Garland, 1/2 doz \$24.00

Hawesville's Delight, 1/2 doz \$15.00

Ladies' Friend, 1/2 doz \$15.00

Ladies' Friend No. 2, 1/2 doz \$18.00

Advance, 1/2 doz \$18.00

Our Leader, 1/2 doz \$19.00

Triumph, 1/2 doz \$20.00

Supreme, 1/2 doz \$22.00

Easy Jap'd, 1/2 doz \$22.00; Nickel, \$24.00

Gilt Edge, 1/2 doz \$24.00

Acme, 1/2 doz \$26.00

Imperial, 1/2 doz \$26.00

Grand Republic, 1/2 doz \$30.00; Nickel, \$33.00

Banner, 1/2 doz \$22.00; Nickel, \$24.00

The Star, 1/2 doz \$21.00

Reliable, 1/2 doz \$22.00

Rapid Jap'd, 1/2 doz \$22.00; Nickel, \$24.00

Our Own, 1/2 doz \$27.00

Model, 1/2 doz \$27.00

Cochran Sweeper Company, Grand

Rapids, Mich., make the following re-

bates:

5 dozen in 6 months, 1/2 doz \$1.00

10 dozen in 6 months, 1/2 doz \$2.00

Except on L.F., when 10 dozen price is \$13.50, and 25 dozen \$13.00.

Lawn

Thompson Mfg. Co., 30¢

Swings

Davies Lawn, 25¢

Tacks, Brads &c.

List October 19, 1893. Old established

straight weights. Short Weight goods

are sold at lower prices.

Carpet Tacks

American, Blue, 60¢

American, Tin'd and Cop'd, 70¢

Steel, Bright and Blue, 60¢

Steel, Tinned and Coppered, 70¢

Swedes Iron, Blue, 80¢

Swedes Iron, Tinned, 75¢

American Iron Tacks, Domestic, 60¢

Swedes Iron Tacks, 80¢

S. S., Blue, 60¢

S. S., Tinned, 70¢

Lanc., Blue, 60¢

Lanc., Tinned, 60¢

Gimp and Lace Tacks, 60¢

S. S., Blue, 60¢

S. S., Tinned, 60¢

Lanc., Blue, 60¢

Lanc., Tinned, 60¢

Basket and Trimmers' Tacks, 60¢

Lanc., 60¢

Hungarian Nails, 60¢

Common and Patent Brads, 55¢

Leathered Tacks, 10¢

Brush Tacks, S. S., 10¢

Looking Glass Tacks, S. S., 35¢

Picture-Frame Points, S. S., 35¢

Finishing Nails, 80¢

Trunk and Clout Nails, 65¢

Black, 65¢

Tinned or Coppered, 67¢

Chair Nails, 52¢

Oiler Box Nails, 52¢

Tin Capped Nails, 50¢

Miscellaneous

Double Point, 90¢ to 10¢ to 10¢

Wire Carpet Nails, 50¢ to 10¢

Claw Handle Carpet, gross \$4.00

Bonnie Blue, box \$1.50

Bill Nye Brad Box, 4 00

Parlarian Gilt Nails, cartoon, 50

Home Tacks, No. 50, 1/2 case (12 car-

tons), \$38.00; No. 100, 1/2 case

(12 cartons), \$72.00.

Home Nails, No. 200, 1/2 case (12 car-

tons), \$30.00; No. 400, 1/2 case (12

cartons), \$60.00.

Upholsterers' Nails, 50¢ to 10¢

Wire Brads and Nails

Steel-Wire Brads, R. & E. Mfg. Co.'s list

50¢ to 10¢

See also Nails, Wire.**Tanks, Oil**

Emerald, S. S. & Co.: 90-gal. \$8.75; 60-

gal., \$11 each, 50¢ to 10¢

Tapes, Measuring

American, 40¢ to 10¢

Spring, 40¢ to 10¢

Whips

American Whip Co.: Length.	4 1/2	5	5 1/2	6	6 1/2	7	7 1/2	8 ft.
X. L. Whalebone Driving.....	\$13.00	20.00	22.00	24.00	27.00	30.00	33.00	36.00
Eureka, Two-thirds Whalebone.....	15.00	18.00	20.00	22.00	24.00	27.00	30.00	33.00
Bull Bone, Half-length Whalebone.....	11.00	12.00	13.00	14.00	15.00	16.00	17.00	18.00
American Standard.....	8.00	8.50	9.00	9.50	10.00	10.50	11.00	11.50
True Grip, Raw Hide Center.....	6.00	6.00	6.50	7.00	7.50	8.00	8.50	9.00
New Name, Stocked Java, Black and Wine Colors.....	6.00	6.00	6.50	7.00	7.50	8.00	8.50	9.00
Americus, 98 Pen Whip.....	6.00	6.00	6.50	7.00	7.50	8.00	8.50	9.00
Gents' Light Driving No. 111.....	6.00	6.00	6.50	7.00	7.50	8.00	8.50	9.00
Gents' Light Driving No. 106.....	6.00	6.00	6.50	7.00	7.50	8.00	8.50	9.00
Hand-made Stocked Java No. 103.....	3.75	4.00	4.25	4.50	4.75	5.00	5.25	5.50
A large variety of cheaper grades.....	50¢	50¢	50¢	50¢	50¢	50¢	50¢	50¢
Team Whips.....	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Toy Whips.....	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Hardware Assortment, 10/American, 75 Whips for \$50.00.....	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00

Wire and Wire Goods—**Iron—**

Market,	Br. & Ann., Nos. 0 to 18.	Extra 5¢/10¢
Br. & Ann., Nos. 0 to 18.	75¢/10¢	5¢/10¢
Cop'd, Nos. 0 to 18.	75¢/10¢	5¢/10¢
Galv., Nos. 0 to 18.	75¢/10¢	5¢/10¢
Tin'd, Nos. 0 to 18.	75¢/10¢	5¢/10¢
Tin'd, Nos. 0 to 18.	75¢/10¢	5¢/10¢

Stone,	Br. and Ann'd,	Extra 10¢
Br. and Ann'd, Nos. 0 to 18.	80¢/10¢	10¢
Br. and Ann'd, Nos. 0 to 18.	80¢/10¢	10¢
Br. and Ann'd, Nos. 0 to 18.	80¢/10¢	10¢
Br. and Ann'd, Nos. 0 to 18.	80¢/10¢	10¢
Br. and Ann'd, Nos. 0 to 18.	80¢/10¢	10¢

Ossawan Mills, Brass and Copper on Spools..... 50¢/10¢
 Tattle Spooled, Tinned & Annealed..... 50¢/10¢
 Tattle Spooled, Cop. and Brass..... 50¢/10¢
 Cast Steel Wire..... 50¢/10¢
 Stubs Steel Wire..... 50¢/10¢
 Steel Music Wire, 12 to 30, imported..... 50¢/10¢

Wire Clothes Line, see Lines..... 50¢/10¢
 Wire Picture Cord, see Cord..... 50¢/10¢

Bright Wire Goods—
 Standard list..... 55¢/10¢
 Wire Cloth and Netting..... 55¢/10¢
 Painted Screen Cloth..... 55¢/10¢
 Galvanized Wire Netting..... 55¢/10¢

Wire Barb—
 See Trade Report.

Wire Rope—See Rope, Wire.

Wrenches—
 American Adjustable..... 40¢/10¢
 Baxter's Adjustable "S"..... 40¢/10¢
 Baxter's Diagonal..... 50¢/10¢
 Coes' Genuine..... 50¢/10¢
 Coes' "Mechanics"..... 50¢/10¢
 Girard Standard..... 50¢/10¢
 Lamson & Sessions' Engineers'..... 50¢/10¢
 Lamson & Sessions' Standard..... 50¢/10¢
 Lamson & Sessions' Agricultural..... 50¢/10¢
 Lamson & Sessions' Agric'l..... 50¢/10¢
 W. & B. Diamond..... 50¢/10¢

Bemis & Call's:
 Pat. Combination Bright..... 40¢/10¢
 Pat. Combination Black..... 40¢/10¢
 Merrick's Pattern..... 40¢/10¢
 Briggs's Pattern..... 40¢/10¢
 Cylinder or Gas Pipe..... 40¢/10¢
 No. 3 Pipe..... 40¢/10¢
 Allen's Pocket (Bright)..... 40¢/10¢
 The Favorite Pocket..... 40¢/10¢
 Webster's Pat. Combination..... 40¢/10¢
 Boardman's..... 40¢/10¢
 Always Ready..... 40¢/10¢
 Alligator..... 40¢/10¢
 Donohue's Engineer..... 40¢/10¢
 Eagle..... 40¢/10¢
 Acme, Bright..... 40¢/10¢
 Acme, Nickel..... 40¢/10¢
 Hercules..... 40¢/10¢
 Walker's..... 40¢/10¢
 Diamond Steel..... 40¢/10¢
 Cincinnati Brace Wrenches..... 40¢/10¢
 Tattle Vise Wrench..... 40¢/10¢

Wringers, Clothes—
 Am. Wringer Co.'s list, July 1, 1898..... 2¢ cash
 Colby Wringer Co., list, Sept. 1, 1898..... 2¢ cash
 Lull Mfg. Co., list, July 1, 1898..... 2¢ cash
 Peerless Mfg. Co., list, Feb. 1, 1898..... 2¢ cash
 National Wringer & Mfg. Co., list, June 1, 1898..... 2¢ cash

Wrought Goods—
 Staples, Hooks, &c., list, March 17, 1898..... 85¢/10¢

Paints, Oils and Colors.—Wholesale Prices.**Animal and Vegetable Oils—**

Linseed, City, raw, per gal.	35	40
Linseed, City, boiled.....	35	40
Linseed, Western, raw.....	30	35
Lard, City, Extra Winter.....	80	85
Lard, City, Prime.....	75	80
Lard, City, Extra No. 1.....	50	55
Lard, City, No. 1.....	45	50
Lard, Western, prime.....	75	80
Cotton-seed, Crude, prime.....	34	36
Cotton-seed, Crude, off grades.....	32	34
Cotton-seed, Summer Yellow, prime.....	39	40
Cotton-seed, Summer Yellow, off grades.....	36	37
Sperm, Crude.....	70	75
Sperm, Natural Spring.....	50	55
Sperm, Bleached Spring.....	60	65
Sperm, Natural Winter.....	81	82
Sperm, Bleached Winter.....	86	88
Whale, Crude.....	48	50
Whale, Natural Winter.....	48	50
Whale, Bleached Winter.....	51	52
Whale, Extra Bleached.....	52	53
Sea Elephant, Bleached.....	52	53
Winter.....	35	40
Menhaden, Crude, Sound.....	35	40
Menhaden, Crude, Southern.....	39	40
Menhaden, Light Pressed.....	39	40
Menhaden, Bleached Wter.....	42	43
Menhaden, Extra Bleached.....	44	45
Tallow, City, prime.....	60	65
Tallow, Western, prime.....	55	60
Cocoonut, Ceylon.....	55¢	60¢
Cocoonut, Cochin.....	60¢	65¢
Cod, Domestic.....	38	40
Cod, Foreign.....	42	45
Red Elaine.....	44	46
Red Saponified.....	44	46
Bank.....	38	40
Straits.....	39	40
Olive, Italian, bbls.....	58	60
Neatsfoot, prime.....	75	80
Palm, prime, Lagos.....	75¢	80¢

Mineral Oils—

Black, 29 gravity, 25 @ 30 cold test.....	7	7 1/2
Black, 29 gravity, 15 cold test.....	7 1/2	8
Black, 29 gravity, summer.....	6	6 1/2
Cylinder light, filtered.....	14	16

Cylinder, dark, filtered.....	10	12
Paraffine, 25 1/2 gravity.....	11	13
Paraffine, 25 gravity.....	10	11
Paraffine, 28 gravity.....	7 1/2	8
Paraffine, red.....	9 1/2	10 1/2

Paints and Colors—

Barytes, Foreign, 10 ton.....	\$22.00	\$24.00
Barytes, Amer. floated.....	29.00	32.00
Paraffine, 25 gravity.....	10	11
Paraffine, 28 gravity.....	7 1/2	8
Paraffine, red.....	9 1/2	10 1/2
Barytes, Amer. No. 1.....	16.00	18.00
Barytes, Amer. No. 2.....	13.00	15.00
Malin's Anale & Tind on Spools.....	60¢	65¢
Malin's Brass and Cop. on Spools.....	50¢	55¢
Ossawan Mills, An'd and Tinned on Spools.....	60¢	65¢
Blue, Celestial.....	6	8
Blue, Chinese.....	4	5
Blue, Prussian.....	25	40
Blue, Ultramarine.....	8	25
Brown, Spanish.....	3 1/2	4
Brown, Andyke, Amer.....	6	8
Brown, Vandike, English.....	6	8
Carmine, No. 40, in bulk.....	2.75	3
Carmine, No. 40, in boxes or barrels.....	2.85	3
Carmine, No. 40, in ounce bottles.....	3.75	4
Chalk, in bulk.....	1.5	2.00
Chalk, in bbls., 100 lb.....	33	40
China Clay, English.....	10	13.00
Cobalt Oxide, prep'd.....	9.00	11.00
Cobalt Oxide, black.....	1.90	2.00
Cobalt Oxide, black, 100 lb.....	1.90	2.00
Green, Paris, in bulk.....	10	10 1/2
Green, Paris, 170 @ 175 lb.....	10 1/2	11
Green, Paris, small pack.....	12	17
Green, Chrome, ordinary.....	6	12
Green, Chrome, pure.....	8	25
Lead, Eng. B.B. white.....	8 1/2	10
Lead, Ann. White, dry or in oil.....	7	7 1/2
Kegs, lots less than 500 lb.....	6 1/2	6 3/4
Kegs, lots 500 lb to 5 tons.....	6 1/2	6 3/4
Kegs, lots 5 tons to 12 tons.....	6 1/2	6 3/4
Kegs, lots 12 tons and over.....	6 1/2	6 3/4
Lead, White, in oil, 25 lb tin.....	6 1/2	6 3/4
Lead, White, add to keg price.....	6 1/2	6 3/4
Lead, White, in oil, 12 1/2 lb tin.....	6 1/2	6 3/4
Lead, White, in oil, 1 to 5 lb as sorted tins, add to keg price.....	6 1/2	6 3/4
Lead, Red, bbls, and 1/2 bbls.....	6 1/2	6 3/4
Lead, Red, kegs.....	6 1/2	6 3/4
Litharge, kegs.....	6 1/2	6 3/4
Litharge, bbls, and 1/2 bbls.....	6	7

TERMS, &c.—Lead and Litharge—On lots of 500 lb or over, 60 days' time or 2 1/2 % discount for cash if paid within 15 days of date of invoice.

Ocher, Rochelle.....	1.35	1 1/2
Ocher, French Washed.....	1 1/2	2 1/2
Ocher, German Washed.....	1 1/2	3
Ocher, American.....	1 1/2	3 1/2
Orange Mineral, English.....	8	10 1/2
Orange Mineral, French.....	8 1/2	9
Orange Mineral, German.....	8 1/2	9
Orange Mineral, American.....	8 1/2	9
Paris White, English Cliff stone.....	1.00	1.15
Paris White, American.....	65	75
Red, Indian, English.....	5 1/2	7
Red, Indian, American.....	9	14
Red, Turkey.....	9	14
Red, Tuscan.....	9	11
Red, Venetian, American.....	130 lb.....	1.00
Sienna, Italian, Burnt and Powder.....	4	5
Sienna, Ital., Burnt Lumps.....	1 1/2	3 1/2
Sienna, Ital., Raw, Powd.....	4 1/2	5 1/2
Sienna, Ital., Raw, Lumps.....	1 1/2	3 1/2
Sienna, American, Raw.....	1 1/2	3 1/2
Sienna, American, Burnt and Powdered.....	1 1/2	3 1/2
Talc, American.....	1 1/2	1 1/2
Terra Alba, Fr'ch.....	100 lb.....	95
Terra Alba, English.....	70	80
Terra Alba, American No. 1.....	65	75
Terra Alba, American No. 2.....	45	50
Umber, Turkey, Burnt and Powdered.....	3 1/2	4
Umber, Turkey Bnt. Ln.....	2 1/2	3
Umber, Turkey, Raw and Powdered.....	3 1/2	4
Umber, Turkey, R'w Lumps.....	2 1/2	3
Umber, Turkey, Bnt. Amer.....	1 1/2	1 1/2
Umber, Turkey, R'w Amer.....	1 1/2	1 1/2
Yellow, Chrome.....	10	25
Vermilion, American Lead.....	11 1/2	12
Vermilion, Quicks'er, bulk.....	53	54
Vermilion, Quicks'er, bags.....	54	55
Vermilion, Quicksilver sm'r pks.....	62	63
Vermilion, English Import.....	85	90
Vermilion, Imitation, Eng.....	8	35
Vermilion, Trieste.....	90	92 1/2
Vermilion, Chinese.....	92 1/2	95
Whiting Common, 100 lb.....	37 1/2	42 1/2
Whiting Gliders.....	45	55

Zinc, American, dry..... 4 1/2 @ 4 1/2
 Zinc, French, Red Seal..... 7 1/2 @ 7 1/2
 Zinc, French, Green Seal..... 9 @ 9
 Zinc, French, V. M. X..... 7 @ 7
 Zinc, Antwerp, Red Seal..... 7 1/2 @ 7 1/2
 Zinc, Antwerp, Green Seal..... 7 1/2 @ 7 1/2
 Zinc, German, L. Z. O..... 6 1/2 @ 7 1/2
 Zinc, V. M. in Poppy Oil, Seal, lots of 1 ton and over..... 10 1/2 @ 11 1/2
 Zinc, V. M. in Poppy Oil, lots less than one ton..... 11 @ 11 1/2
 Zinc, V. M. in Poppy Oil, Red Seal..... 10 @ 10 1/2
 Zinc, V. M. in Poppy Oil, lots of less than 1 ton..... 10 1/2 @ 10 1/2
 Discounts.—French Zinc.—Discounts to buyers of 10 bbl. lots of one or assorted grades, 1 1/2 %; 25 bbls., 2 %; 50 bbls., 4 %. No discount allowed on less than bbl. lots.

Colors in Oil—
 Black, Drop, Frankfurt..... 25 @ 30
 Black, Drop, English..... 12 @ 15
 Black, Drop, Domestic..... 7 @ 10
 Black, Lampblack, Best..... 20 @ 35
 Black, Lampblack, Common..... 7 @ 13
 Black, Ivory..... 8 @ 15
 Blue, Chinese..... 35 @ 40
 Blue, Prussian..... 20 @ 45
 Blue, Ultramarine..... 12 @ 18
 Brown, Vandike..... 7 @ 12
 Green, Chrome..... 8 @ 13
 Green, Paris..... 16 @ 18 1/2
 Sienna, Raw..... 7 @ 14
 Sienna, Burnt..... 7 @ 14
 Umber, Raw..... 7 @ 10
 Umber, Burnt..... 7 @ 10

Putty—
 In barrels and 1/2 bbls..... 0.13 @ 0.14
 In tubs..... 0.13 @ 0.14
 In cans..... 0.13 @ 0.14
 In bladders..... 0.13 @ 0.14

Spirits Turpentine—
 In regular bbls..... @ 29 1/2
 In machine bbls..... @ 30

Glue—
 Low Grade..... 8 @ 10
 Cabinet..... 12 @ 14
 Medium White..... 13 @ 15
 Extra White..... 17 @ 20
 French..... 10 @ 22
 English..... 10 @ 15
 Irish..... 12 @ 15

THE IRON AGE.

The oldest paper in the world devoted to the interests of the Hardware, Iron and Metal Trades, and a standard authority on all matters relating to those branches of industry.

RATES OF SUBSCRIPTION: INCLUDING POSTAGE.**UNITED STATES AND BRITISH AMERICA.**

Weekly Edition, Issued every THURSDAY MORNING.....	\$4.50 a year.
Semi-Monthly Edition, First and Third THURSDAYS of every month.....	2.30 "
Monthly Edition First THURSDAY of every month.....	1.15 "

ALL OTHER COUNTRIES.

Weekly Edition: \$5.00 = £1 = 25 francs = 20 marks = 11 florins = 6 roubles (coin) = 25 lire = 20 pesetas.	
Semi-Monthly Edition: \$2.50 = 10/ = 12 1/2 francs = 10 marks = 6 florins = 3 roubles (coin) = 12 1/2 lire = 10 pesetas.	
Monthly Edition: \$1.25 = 5/ = 6 1/4 francs = 5 marks = 3 florins = 1 1/2 roubles (coin) = 6 1/4 lire = 5 pesetas.	

RATES OF ADVERTISING: ONE SQUARE (12 LINES, ONE INCH).

ONE INSERTION.....	\$2.00	SIX MONTHS.....	\$30.00
ONE MONTH.....	7.50	ONE YEAR.....	50.00
THREE MONTHS.....	17.50	Rates for larger spaces quoted on application.	
New York (Main Office),.....	96-102 Reade Street,	DAVID WILLIAMS, Publisher.	
Philadelphia.....	220 South Fourth Street,	THOMAS HOBSON, Manager.	
Pittsburgh.....	Room 509, Hamilton Building.	ROBERT A. WALKER, Manager.	
Chicago.....	59 Dearborn Street, cor. Randolph,	J. K. HANES, Business Manager.	
Cincinnati.....	Rooms 22-24 Pickering Building,	GEO. W. COPE, Resident Asso. Ed.	
St. Louis.....	Bank of Commerce Building,	HENRY SMITH, Manager.	
Boston.....	146 Franklin Street,	H. H. ROBERTS, Manager.	
Cleveland.....	312 The Cuyahoga,	WALTER C. ENGLISH, Manager.	
		EZRA S. ADAMS, Manager.	

BRITISH AGENCY: Office of The Ironmonger, 42 Cannon St., London.

AUSTRALIAN OFFICES: Melbourne, 231 Elizabeth St.; Sydney, 234 Clarence St.

Remittances should be made by draft, payable to the order of DAVID WILLIAMS, on any banking house in the United States or Europe, or by P. O. Money Order on New York. When these cannot be obtained, postage stamps of any country will be received. Newsagents or Bookellers in any part of the world may obtain The Iron Age through The American News Company, New York, U. S. A. The International News Company, New York, U. S. A., and London, England; or The San Francisco News Company, San Francisco, Cal., U. S. A.

Entered at the Post Office, New York, as Second-Class Matter

This is a reproduction of a library book that was digitized by Google as part of an ongoing effort to preserve the information in books and make it universally accessible.

GoogleTM books

<https://books.google.com>

